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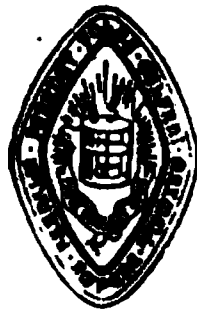
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The Journal of **Advanced** **Therapeutics**

*Official Organ of the
American Electro-Therapeutic Association
Official Organ of the
International Association of Climatologists*

PUBLISHED MONTHLY



VOL. XXXI.

EDITED BY WILLIAM BENHAM SNOW, M.D.

THE A. L. CHATTERTON COMPANY

79 DUANE STREET, NEW YORK, N. Y.

1913

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1480

DEC - 6 1916
The Journal of
G. C.

Advanced Therapeutics

Vol. XXXI.

JANUARY, 1913.

No. 1

DEC 12 1916

Edited by DR. WILLIAM BENHAM SNOW

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PHYSICAL AGENTS IN THE TREATMENT OF MALIGNANT CONDITIONS.

The treatment of *cancer* has been a problem of the ages. A problem which is still far from an adequate solution, but, step by step, progress is making towards what may ultimately discover successful methods of control.

But a short time since the surgeons ignored other methods than the knife. Those who essayed to employ other means were often held in contempt. During the past two years, however, there has been evidence of increasing conservatism among surgeons. It must now be generally conceded that surgery as a single agent has been found wanting; for it has been found that recurrence with extensive invasion of remote parts often follows operation. This has caused the removal of small sections for diagnosis to be condemned by many, lest by opening the lymph channels the process might be extended.

One by one, other means have been introduced with varying measures of success—*caustic pastes, actual cautery, the Roentgen ray, radium, destructive fulguration, or effluvation, electro-coagulation, electro-chemical surgery, carbonic acid ice, and surgery combined with fulguration by the de Keating-Hart method, or the Roentgen ray*, have each been effective in selected cases.

The Roentgen ray in the treatment of malignant disease has been on trial for more than twelve years, and it has now become an established fact that in the treatment of epithelioma, in other than exceptional cases, it is effective in per-

manently relieving small, superficial epithelioma. It is well established also that it inhibits or delays the process in all malignant cases. It is particularly effective in sarcoma, many cases of which have remained well for upwards of eight or ten years following treatment by the Roentgen ray.

In carcinoma the success has been less marked though it has always demonstrated its efficiency in arresting and hindering the development of the process, and in exceptional cases cures have been reported. In association with surgery, the x-ray has established a most valuable place. Some of the most enthusiastic observers have taken the stand that even without surgery in the average case life has been prolonged for a longer time by the single use of the x-ray than by the single use of the knife. Employed with surgery as a preoperative and postoperative procedure, there are many cases that have remained cured. Some observers have taken the stand that only the postoperative method should be considered. It is becoming a generally conceded principle by all broad-minded surgeons that the Roentgen ray should at least always follow the operative procedure. This, however, is, in most cases, not done as promptly as conditions would seem to demand. The writer believes that the ray should be used on the day following the operation, that there may be less danger of an extension of the process along the lymphatic channel, of which there is so much evidence on record. In this connection the removal of the lymphatic glands would seem to be a questionable procedure, especially so, when the efficiency of the x-ray in arresting the process where induration has not already been established, thereby countermanding the radical Halstedt operation. Why the glands should be removed when they serve to prevent the extension of the process, when the Roentgen ray may be employed to arrest further development is a question to be determined.

Caustic pastes have been used more or less for two generations, for the removal of epithelioma and other superficial growths, and have proved effective in skilled hands. This method, however, is too painful to be employed when other means equally good are at hand.

The actual cautery has been used in the treatment of uterine cancer, sometimes with marked skill and success,

at least arresting hemorrhage, retarding the process, and for the time abating the odor or fetor of the discharges.

Electro-chemical surgery.—The method of Dr. George Betton Massey — employs metallic ionization with the positive pole of the constant current; whereby the ions of zinc or of zinc and mercury are driven into the tissues with great energy; the application being made with the patient under an anesthetic, with needles of zinc, amalgamated or not with mercury inserted into the cancerous tissue. The current is passed into the indurated mass until it is gradually softened throughout its whole extent. This method is followed by a slough of the tissues thus destroyed. The surrounding zone is more or less sterilized by the ions. This method has proved exceptionally successful in the treatment of epithelioma and cancer of the tongue and mouth, and has been employed also as a massive operation for the removal of tumors of the breast, rectum, uterus, and other parts of the body.

It is similar in its action and effect, and possesses some advantages in selected cases, to the coagulation method of Doyen. It is always possible with this method to localize with the finger, during the process of the treatment, the extent of the effect of the current by the softening which follows, thereby destroying the diseased parts without needless destruction of normal tissue, and, at the same time, making certain to thoroughly remove all of the indurated area. The disinfection likewise of the surrounding zone by the diffusion of the ions of zinc and mercury seems to have the effect of lessening the possibility of recurrence. It would seem, however, that in these cases, the postoperative employment of the Roentgen ray would still farther preclude the possibility of recurrence. The heat produced by the employment of strong currents by this method undoubtedly also produces a certain degree of coagulation necrosis, especially in the treatment of large tumors, because they have constantly to be cooled during the passage of the current by the local application of a stream of cold water; otherwise the tissues will steam from the heat during the operation. For this reason the method might be considered a combined coagulation necrosis and ionization method, the temperature being often sufficient to produce coagulation necrosis.

Radium has won great favor in the treatment of giant-cell sarcoma and superficial epithelioma, but has proved generally effective in the treatment of carcinoma and the other types of sarcoma. At first employed by Professor Wm. J. Morton, by inserting a tube of radium into the cancerous mass, the results are often remarkable. One case treated by him in this manner more than six years since, in which there was separation at the junction of middle and upper third of the humerus, made a complete recovery and remains cured to the present time. Similar results have been obtained by the editor and others in this form of sarcoma, but as far as search of records indicates, it has not been shown that any measure of success has been obtained by its employment in other types of malignant disease, except superficial growths. Abbey and Morton in this country, and numerous foreign observers have been successful in removing superficial growths with radium. The field, however, seems to be limited to the types referred to, though much research is still being made with the hope of arriving at a technique which will be successful with it in other type of malignant disease.

The electro-coagulation method of Doyen has proved effective in removing malignant growths. By the judicious employment of definite degrees of heat, the diseased cells are destroyed, while the normal tissues in the field surrounding the induration resist the same temperature. This method is, however, fully described in the paper by Dr. Russell elsewhere in this issue of the JOURNAL. The method is on trial and its limitations will probably be demonstrated in the near future.

The effluvation of Rivière, later designated as fulguration after de Keating-Hart and known as destructive fulguration, is a destructive method, whereby discharges of short and hot high-frequency sparks applied directly to the seat of the malignant growth, produces destruction of cells both normal and abnormal, which is followed by a slough and removal of the process. This method is particularly well adapted to the removal of condylomata, epitheliomatous growths, pappilomata and small tumors in the mouth, bladder and other mucous cavities.

The desiccation method first described by Dr. Wm. L. Clarke, which employs high potential sparks from a prop-

erly constructed resonator connected with a high power static machine, is particularly effective, destroying the tissues by drying and at the same time coagulating the tissue cells; thereby effecting a result similar to that by the method previously described, and is applicable to the same class of cases. It is preferred by some for the destruction of the superficial class of cases. It has also been used successfully for removing some extensive growths by Dr. Clarke.

Fulguration as applied by de Keating-Hart, either alone in superficial affections or following surgical removal, is remarkably effective and has been followed by very promising results in the treatment of all forms of malignant affections, including those involving the deeper structures of the body. The results already obtained by this method which employs prolonged application of long Oudin sparks of low amperage to the open surface of the wound is described by Dr. Wm. Seaman Bainbridge. This method, from the results obtained during the past five or six years by Dr. de Keating-Hart, and more recently by Dr. Bainbridge at the New York Skin and Cancer Hospital, promises a greater measure of success than the previous methods of managing the more extensive types of malignant disease. The method is fully described elsewhere in this issue, and is deserving of much consideration, promising as it does to leave the tissues sterile or in a condition anticipating recurrence in which other methods, except the joint use of surgery and the Roentgen ray, have failed. It is possible that this method will supplant the radical Halsted operation, leaving the glands *in situ* as defenses against possible extension by way of the lymphatic channels.

Carbonic acid snow has been recently employed in the treatment of superficial epithelioma and other superficial conditions with a fair measure of success and though painful it is, has proved effective in many of these cases.

Thermo-radiotherapy, so-called, by de Keating-Hart, is on trial, and is still a matter of divided opinion. It is claimed that rendering the tissues anemic with cold increases its resistance against the inhibitory effects of the Roentgen ray, and contrarywise, if the tissues are rendered hyperemic, the effects are intensified. The thermic effects of the direct d'Arsonval current as employed in this connection with the x-ray seem to strengthen this hypothesis, as shown by recent reports.

It will be observed, therefore, that the place filled by physical therapeutics in the treatment of malignant disease is a most important one, which demands general recognition.

FULGURATION AND THERMO-RADIOTHERAPY.*

BY WILLIAM SEAMAN BAINBRIDGE, A.M., SC.D., M.D.

NEW YORK.

Definition of Terms.

The term "fulguration" (lightning), first applied to the de Keating-Hart method of employing high-frequency discharges of electricity in the treatment of cancer, has come to be employed carelessly in the designation of certain other methods of treating neoplasms, malignant and benign, by means of high-frequency currents.

The term "fulguration" has come to be associated, in the minds of many electro-therapeutists, with the Riviere-Keating-Hart priority controversy which has been waged over the methods advocated respectively by Riviere and de Keating-Hart.

It is not my purpose on this occasion to endeavor to elaborate or to elucidate this controversy. It may not be amiss, however, in the effort to avoid further confusion of terms, to attempt to give a succinct definition of each of the methods to which the term "fulguration" has been applied.

Such an exposition may serve, incidentally, to emphasize the importance of the position which this Association has assumed with reference to a scientific nomenclature in electro-therapy. It is to be hoped that through the efforts of this learned body such confusion of terms will speedily be relegated to the past.

GENERAL CLASSIFICATION OF METHODS.

It may be stated in the beginning that the various methods under discussion are applications of high-frequency currents of electricity. They may be broadly considered as coming within the following classes:

(1) *Cauterization*, or destruction of the growth, with mono-

* Presented, by invitation, with lantern-slide demonstration, before the American Electro-Therapeutic Association, Richmond, Va., September 4, 1912.

polar or bipolar current, and with short spark, of high frequency, high tension and low amperage, often inaccurately called "fulguration," sometimes described as "destructive fulguration," better, perhaps, designated as "high-frequency cauterization."

(2) *Cauterization*, or destruction of the growth, by using a specially constructed apparatus, with monopolar or bipolar current, with short or long spark, or effleuve, of high frequency, and relatively low tension and high amperage. Rivière's method comes within this class.

(3) *Desiccation*, or the "drying out" of the growth, with a monopolar current, short spark of high frequency and high tension, the action of which is not carried to cauterization, but of rapidly dehydrating the neoplasm and converting it into an inert mass. This is Clark's method.

(4) *Thermo-Penetration*, or the heating of the diseased tissue to a higher or lower degree, by means of a bipolar current of high frequency, relatively low tension and relatively high amperage. The heating of the diseased mass may be carried to the point of tissue coagulation, diathermy (Nagelschmidt), and electro-coagulation (Doyen), being types of this method; or only such a degree of temperature may be employed as will render the tissues more radio-sensitive, de Keating-Hart's "thermo-radiotherapy" being a type of the latter.

(5) *Fulguration*, or the application, *to the area from which all macroscopic evidence of malignancy has been removed*, of a monopolar current of high frequency, high tension, relatively low amperage, with a cooled long spark—"cold lightning," as some critics have called it. This is the de Keating-Hart method. The purpose of this sparking is to modify the local trophism in such a way that any remaining cancer cells, being badly nourished, will tend to retrograde, the probability of recurrence being thus lessened. The action is not at all dependent upon the heat effects of the spark; the important factor being, rather, the sedation of the cancer cells. By centering the electrode upon a given area, instead of keeping it in constant motion, as insisted upon by de Keating-Hart, the application may be carried to the point of the immediate

² Rivière. Alto-frequent Cytolysis of Cancer. *Journal of Advanced Therapeutics*, July, August and September, 1909, pp. 337, 380 and 433, respectively.

destruction of tissue by heat, but this is distinctly not fulguration, as the term was employed by Pozzi and accepted by de Keating-Hart.

THE VARIOUS METHODS TO WHICH THE TERM "FULGURATION" HAS BEEN APPLIED.

Alto-frequent Cytolysis, Alto-frequent Scintillation, Effluvation, Etc. (Rivière.)

It is generally conceded, I believe, that Rivière, of Paris, was the first to employ the high-frequency discharge with a current of sufficient energy to destroy living tissue. His method of treating malignant tumors by high-frequency sparking and effleuves, to which, he declares, the term "fulguration" was subsequently applied, was first described by Rivière¹ in 1900. His conclusions at that time were that "high frequency currents appear to cure small facial epitheliomata and to exercise, in certain cases, a beneficial influence on the evolution of some malignant tumors. *They first produce a thermo-electrical-chemical action, the effect of which is to eliminate neoplastic tissues, and, if we admit the parasitic theory, to destroy micro-organisms and their toxins; and, in the second place, they produce a tropho-neurotic curative action, which brings back the vital processes to the normal state.*

"It could not be a contemplation to employ the thermo-electrical-chemical action for the elimination of large tumors, for which excision is the elective treatment, but the surgical operation should be followed by the preventive and curative treatment in recurrent cases.

"High-frequency currents, and, more especially, the monopolar effleuves of Oudin's resonator, seem to exercise this action by modifying the vitality of the new regions contaminated by the surgeon's knife during the operation, after having drained and disinfected them. This special mode of applying electricity seems at the present time one of the only therapeutic methods to be tried in cases of inoperable tumors."

Rivière reviewed the subject in 1909,² asserting that since 1900 he had maintained that "every operation for malignant

¹ Rivière, J. A. Action of High Frequency Currents and of the Effluves of Oudin's Resonator on Certain Malignant Tumors and on Tuberculosis. First International Congress of Medical Electrology and Radiology, Paris, 1900.

growths should be *immediately followed by the application of high-frequency sparks and effleuves*, in order to avoid contamination of the *open surgical wound* and to prevent recurrence." He declared that by means of different electrodes he could pass from the very finest shower of sparks (*effleuve*) to fat, short (4 to 5 centimeters) sparks, and even to sparks and *effleuves* of from 5 to 15 centimeters in length. He insisted that de Keating-Hart added nothing to the Rivière method except the "useless spraying, or blowing, of air" through the electrode. Rivière did not agree that the high voltage claimed for the de Keating-Hart method was correct, but that on the contrary the amperage of the latter method is high. For these various reasons it was maintained that the two methods were exactly alike, except for the current of air to which reference has been made.

The correctness of these statements may be judged from the appended description of the de Keating-Hart method.

"Destructive Fulguration."

The term "destructive fulguration" is sometimes applied to the ordinary high-frequency electro-cauterization employed by many surgeons and electro-theraputists in the treatment of benign and malignant neoplasms. In this method a bipolar current, with a short spark, is utilized for "burning down" the growth. With a special apparatus a monopolar current, with long spark, as described by Rivière, may be used. The application, with various machines, of the high-frequency current, with short spark, is the method most frequently referred to as fulguration, and which is most commonly confounded with the fulguration of de Keating-Hart. It is also designated as "electro-carbonization."

The danger of such confusion of terms may be readily understood when it is recalled that the "burning down" of neoplasms is distinctly harmful unless the destruction is complete of both macroscopic and microscopic malignant tissue. Careful observations have led to the conclusion that cancer cells at a distance from the area cauterized may be stimulated by the action of the short spark. As Rivière himself has pointed out, this method cannot be employed for the destruction of large tumors.

Oscillatory Desiccation (Clark).

According to Clark,³ heat effects range in degree from hyperemia to burning, and somewhere between these two extremes there is a point, the effect of which is more than hyperemia and less than burning, which may be called the desiccation point. His method of treating neoplasms consists in the production, the control and sustaining of heat sufficient to cause the rapid dehydrating of the part treated, sterilizing and converting it into an inert mass. This is accomplished by a specialized, true oscillatory high-frequency current, concentrated to a very fine metal point, and delivered in sparks of great frequency through an air space to the tissue. He employs a static machine with a large output (3 to 6 milliamperes).

This method is often referred to as fulguration. Fulguration, "as practiced at home and abroad for several years," according to Clark, "is not desiccation, the thermic degree being too high, and the impact against the tissue too severe." He doubtless refers in this statement to the so-called "destructive fulguration."

Thermo-penetration (d'Arsonval).

In 1896 d'Arsonval demonstrated the power of the high-frequency current to cause a decided rise of temperature in tissues interposed between two electrodes. This property of thermo-penetration has been variously utilized by different investigators. By some, notably de Keating-Hart, it has been employed for the purpose of heating the tissues with a view to rendering them more radio-sensitive; by others (Nagelschmidt and Doyen), it has been used as a means of destruction of neoplasms.

Diathermy, or Transthermy (Nagelschmidt).

In 1907 Nagelschmidt, in Berlin, von Brendt, Preeps, and Zeyneck, in Vienna, and de Kraft, in New York, experimented independently with the thermo-penetrative power of the high-frequency current. Since that time this method has

³Clark, William L. Oscillatory Desiccation in the Treatment of Accessible Malignant Growths and Minor Surgical Conditions: A New Electrical Effect. *Journal Advanced Therapeutics*, 1911, xxii, 169. Also, A Preliminary Report Upon the Destruction of Surface and Cavity Neoplasms by Desiccation. *New York Medical Journal*, 1911, xciii, 1131.

been employed by surgeons in different centers, generally under the name diathermy, applied by Nagelschmidt. The apparatus employed permits the elevation of the temperature of the deep tissues to any required extent, the tumor being destroyed by the coagulation of the tissues. This is merely a thermic means of destruction, having no effect whatever upon the trophic centers.

Nagelschmidt,⁴ in a lecture on diathermy and electro-coagulation, delivered before the Electro-Therapeutic Society of London, called attention to the fact that, in passing a high-frequency current through a patient a rise of temperature, which is easily shown by a thermometer, is noted, this rise being largely proportional to the amperage. The greater the amperage, the greater the heating. Inasmuch as the ordinary high-frequency machines are of relatively high tension and low amperage, and inasmuch as diathermy calls for high amperage and relatively low tension, or voltage, Nagelschmidt employed a special apparatus of high amperage and relatively low voltage. This machine has a range of from zero to 2½ amperes.

The current may be applied merely to the extent of heating the tissues, as employed in the treatment of rheumatism, sciatica, etc., or it may be carried to a sufficient extent to cause tissue coagulation, as employed in the destruction of accessible malignant or benign growths, removal of tonsils and adenoids, etc. In the treatment of cancer Nagelschmidt coagulates a layer, removes it, then coagulates another layer, and so on, until the entire mass is removed.

Electro-Coagulation (Doyen).

Doyen, after experimenting to determine the thermal death-point of cells, concluded that cancer cells are destroyed by a temperature of 122-131 degrees F. (50-55 degrees C.) Normal cells were found to resist up to 140 degrees F. (60 degrees C.) He employed the high-frequency current for the production of the thermic death of cancer cells, devising for the purpose a special apparatus, with a range of from 10 to 15 amperes. This machine is much more powerful than

⁴Nagelschmidt, F. The Thermal Effects Produced by High-frequency Currents and the Therapeutic Uses of Diathermic Treatment. *Proceedings Royal Society of Medicine*, London, 1910-1911, IV, Electro-Therapeutic Section, 1-12. Also, *Archives of Roentgen Ray*, September, 1910—The Method of Diathermy in Surgery.

that used by Nagelschmidt, being capable of the complete coagulation of a large mass at one operation. The cell destruction in this method is the result of tissue coagulation, just as is the case with diathermy.

With the Doyen apparatus at the New York Skin and Cancer Hospital, used for both electro-coagulation (Doyen) and diathermy (Nagelschmidt), it is possible to coagulate tissues to a depth of 5 to 8 centimeters in from one to two minutes. The apparatus produces a current of about three million oscillations per second, and of a strength of from 10 to 15 amperes. The active electrode is placed directly in contact with the tissue, thereby suppressing all sparks.

Bipolar Voltaization (Doyen).

When the electrode is held away from the part being treated, and the sparks are allowed to play upon the area, a superficial carbonization takes place, the underlying tissues being coagulated as when the electrode is placed directly in contact with the part, though not to the same depth. To this method Doyen applied the term bipolar voltaization.

Fulguration (de Keating-Hart).

We come now to a consideration of the method to which the term "fulguration" was first applied, viz., the fulguration of de Keating-Hart. It will be understood that in the following pages "fulguration" applies *only* to this method.

Theoretical Basis of Fulguration.

The premise upon which the de Keating-Hart method of fulguration has been developed is that the *monopolar long spark of high frequency and high tension acts not upon the neoplasm, but upon the soil on which the neoplasm has developed.*

Three groups of facts are relied upon by him to establish the premise:

(1) That sparking, even when used with inadequate surgical operation, gives undeniable results, insufficient, perhaps, but already very definite.

(2) That the tumor is in no way modified in its appearance or in its vitality, from which one may reasonably conclude that it is not the tumor itself, but the condition of its nutrition—that is to say, the environment in which it develops—that is transformed.

(3) That laboratory experiments and clinical observations furnish plausible explanations of the foregoing.

It is not within the scope of this communication to detail the experiments which de Keating-Hart and others have conducted for the purpose of determining the action of fulguration upon malignant neoplasms. These have been fully described in de Keating-Hart's various publications, and in my recent article on the subject.⁵

Method of Application.

Apparatus.—The production of fulguration sparks may be accomplished by means of very differently adjusted apparatus. Static electricity and the city current may be utilized, according to the case. The following list comprises the equipment to which de Keating-Hart gives preference, and which we now employ at the New York Skin and Cancer Hospital:

(1) Electric current: city current, dynamos, or accumulators, etc., may be used.

(2) A table holding the rheostats, amperemeters, etc.

(3) A transformer coil with rapid interrupter, or transformer, in the closed magnetic current (alternating current).

(4) A condenser furnished with a spark gap.

(5) Oudin's resonator.

(6) A bellows furnished, according to the case, with a foot-pedal, or with a tube of carbonic acid, or an electric pump with disinfected air, the latter being used by us.

(7) Special electrodes of de Keating-Hart.

(8) An operating table of wood or metal. The latter is used at the New York Skin and Cancer Hospital. When a wooden table is employed it must be grounded in order to prevent burning the patient.

Surgical Technic.—The first step of fulguration is purely surgical. This depends entirely upon the exigencies of the case, and need not be given detailed consideration here. Fulguration is essentially a method of treatment for *operable* cancers. The more complete the removal of diseased tissue, the more certain, according to de Keating-Hart, is the freedom from recurrence. The possibility of complete cure

⁵ William Seaman Bainbridge. The de Keating-Hart Method of Fulguration and Thermo-radio-therapy. *Medical Record*, July 6 and 20, 1912.

and absolute prevention of recurrence is commensurate with the extent to which eradication may be carried. Where only partial removal of diseased tissue is possible the method of fulguration is palliative rather than curative. In these cases thermo-radiotherapy is advocated.

Electrical Technic.—The electrical technic is simple in its description and delicate in its application. The general rule laid down by de Keating-Hart is as follows: Spark for a long time, using powerful sparks of high frequency and high tension, applying them to the area from which every macroscopic trace of cancer has been removed. It is, then, *under* the cancer, and not *upon* it, that the electrical discharge is applied.

The spark should be white, producing the sensation of a violent shock, its mean length to be from ten to twelve centimeters. An important detail is to utilize the spark at its maximum length. The electrode should be kept in constant motion, and should be regularly passed over the surface being treated. The reason for this is twofold: (1) In order to avoid carbonization of the points at which the sparks strike the tissue; (2) in order to equalize the dosage, save at suspected points where one must work energetically.

The dosage or the duration of the application of the spark upon the given point cannot be established in other than an empirical manner. It is not difficult to comprehend the reason for this, when one realizes that no two apparatus are exactly alike, and that in the same apparatus there may be great variations in the primary current, the distance of the spark-gap, and the conductibility of the air which surrounds it, all of which bear an influence, as does likewise the insulation of the patient. Under such conditions the electrical properties of the spark are subject to enormous variation. As a general rule, however, one may advise "ten minutes of fulguration for an area of ten square centimeters." This is near enough for ordinary purposes, in the majority of cases, and with the usual apparatus.

Another guide in the matter of duration is the change in the color of the tissues being fulgurated. As tissues take on a slightly darker tinge, not from destruction, but from the deposit of small blood-clots produced at the surface through contact with the spark. This change of color varies

with the tissue involved. While the muscles take on the tinge of smoked meat the bones become slightly yellow. In reality these appearances are apt to be deceptive, depending upon the manner in which the sparking is carried out, and upon the thickness of the sanguinolent fluid through which it passes. As a rule, bones should not be fulgurated as long as the muscles, or the vessels as long as the tendons.

The two main points to be emphasized are: (1) Sufficient removal of the diseased tissue; (2) powerful sparking of the underlying tissues.

De Keating-Hart's Claims.

The employment of the high-frequency short spark (from 1 to 4 centimeters), at a relatively low tension, produces the effect of cellular stimulation; it provokes a rapid cicatrization of wounds, and exerts a remarkable action upon torpid ulcers. On the other hand, the high tension spark, of a minimum length of eight centimeters, applied for a sufficiently long period of time in proportion to the surface fulgurated, retards cicatrization and transforms a given area into a torpid wound. The wound fills up, but the surrounding healthy tissue contracts. There is, according to de Keating-Hart, a natural autoplasty, not a cicatrization. He considered that the same trophic phenomenon that prevented the reformation of healthy epidermis after fulguration, retarded or suppressed the propagation of cancer *in situ*. The microscopic cancer cell, not the macroscopic growth, is attacked indirectly and destroyed by this method.

It is claimed by de Keating-Hart that all kinds of cancer have given good results under fulguration. In very advanced cases, he says, important palliative effects, such as the suppression of pain and hemorrhage, cicatrization, increase of strength, prolongation of life, have been noted in more than 70 per cent. of the tumors treated by the method. Cancer of the breast has given him 39.5 per cent. cures. Cancers of the buccal mucosa have given 83 per cent. of freedom from recurrence for periods varying from 7½ months to 2 years. He reports 89 per cent. of successes, for a mean duration of 16 months, in inoperable sarcomas treated by means of fulguration.

Apparent Results.

The nature of the method, and its combination with radical surgical procedure, tend to make one cautious in accepting the results as more than apparent cures until a longer time has elapsed and a larger number of observations published. Whether apparent or real, the reported cures and the cases of seemingly great amelioration of symptoms and prolongation of life have led us to believe the method worthy of an exhaustive trial. We have accordingly installed a de Keating-Hart fulguration apparatus at the New York Skin and Cancer Hospital, where, since last November, we have been treating cases by this method. A number of cases which were seemingly far beyond hope of improvement by any other known means have been markedly benefited. It is manifestly too early to say what the ultimate outcome in these, or any other cases will be, or to give more than a preliminary statement concerning the work.⁶

Thermo-Radiotherapy.

Thermo-radiotherapy is a method of thermo-penetration—a heating of the diseased tissue, with the addition of a cooling of the skin—the purpose being to render the tissues to be treated more sensitive to the x-rays.

The method is based upon the hypothesis that, other things being equal, the radio-sensitiveness of tissues depends upon their temperature. In other words, the higher the temperature (between normal vital limits), the greater the destructive power of radiation upon them.

Elaborating this idea, de Keating-Hart has formulated the method to which he applied the term thermo-radiotherapy. The heating of the tissues is accomplished in the following ways:

(1) In the case of tumors with abundant blood supply, such as sarcomata, physiological hot serum is injected at 50 degrees C., and in such a quantity as to raise the internal temperature of the neoplasm to about 41 or 42 degrees C.

(2) In case of cancer developed in the natural cavities (rectum, vagina, stomach), irrigations as warm as possible

⁶ Lantern-slide pictures of some of the cases treated by de Keating-Hart were shown. Two patients, who live near Richmond, and who have been under treatment at the New York Skin and Cancer Hospital, were presented.

are used during a time varying with the needs of the individual case.

(3) In tumors of woody consistency, that can be heated neither by injection nor irrigation, high-frequency currents are employed either by passing the current through needles thrust into the skin, or through an electrode placed on the skin surface. This method is not new.

In order to obviate the danger of x-ray dermatitis in the tissues rendered more radio-sensitive, de Keating-Hart conceived the idea of cooling the organs to be protected. This is accomplished chiefly by two means:

First, the surface is covered with cracked ice wrapped in cotton.

Second, a special apparatus may be employed which cools by blowing the dampened surface with bellows.

Whenever possible, x-rays should be applied during the heating of the cancer, especially when the neoplasm is small and superficial. If the mass is deeply situated, as in uterine cancer, it may retain its warmth long enough for the irradiation to follow immediately after the warming process.

The irradiation must be subjected to the usual rules of radiotherapy. Care must be exercised to prevent auto-intoxication from too rapid cytolysis.

The method is being tested at the New York Skin and Cancer Hospital in a number of cases,⁷ in some of which there has been marked relief of pain. It is entirely too early, however, to predict ultimate findings; this communication is, therefore, to be considered as a purely preliminary statement.

34 Gramercy Park.

⁷Lantern-slide pictures of patients treated by this method were presented, showing apparently beneficial results.

DIATHERMY AND ELECTRO-COAGULATION OF DOYEN.*

BY WORTHINGTON SEATON RUSSELL, M.D.,

Research Fellow and Chief of the X-ray Department, New York Skin and Cancer Hospital, Director of the X-ray Laboratory, College of Dental and Oral Surgery of New York, etc., New York City.

Electro-coagulation is a term that has been employed by Doyen, of Paris, to designate a method in which currents of high frequency are used for destroying neoplasms by coagulation.

Nagelschmidt uses the name diathermy to indicate the same process, and also applies it to a method in which an elevation of temperature is produced in the tissues without any destructive effect.

That currents of high frequency produce an increased temperature has been known since d'Arsonval, in 1896, showed that if the current be allowed to pass through the body there follows a decided rise of temperature in the tissue interposed between the electrodes. It remained, however, for Doyen, Nagelschmidt and other investigators to utilize this heat property in the treatment of quite a variety of diseased conditions.

Doyen had conducted a series of experiments to determine the thermal death-point of various cells, and, as a result, advanced the opinion that cancer cells are much less resistant to heat than are the normal cells. By employing very sensitive thermometers, and after a number of corroborative tests, he reached the conclusion that cancer cells are destroyed by a temperature of between 50° and 55° C. (122°-131° F.), while normal cells are resistant up to 60° C. (140° F.).

This claim, in the opinion of Doyen, having been established, an endeavor was made by him to find that form of heat that would meet the necessary requirement of being able to penetrate the deep tissue and at the same time destroy the cancer cells lying therein. Hot air, superheated steam and hot water were employed, but while these agents acted most

*Read at the annual meeting of the American Electro-Therapeutic Association, Richmond, Va., Sept. 4. 1912.

energetically upon the superficial structures, there was absolutely no effect beyond a depth of 4 to 5 millimeters, and, consequently, the use of them was abandoned.

About this time, 1907, Pozzi announced to the Academy of Medicine the use of sparks of high frequency in the treatment of superficial cancer, whereupon Doyen began the employment of this modality.

He began to study the action and effect upon cancer in deep tissues, and finally claimed that the heat produced by currents of sufficient strength causes a coagulation of the tissue and a destruction of cancer cells, even at a considerable depth, without a destruction of the normal cells at the same depth. The best results were obtained by placing the patient in contact with a metallic table connected with one extremity of the high frequency apparatus, while the other extremity was connected with the active electrode placed in an insulating handle. Later, the technic was modified, the patient being insulated in a thick rubber pad. The active electrode may be placed directly in contact with the tissue, thereby suppressing all sparks, designated by Doyen as electro-coagulation, or it may be held a distance from the part under treatment, thus allowing a shower of *very short sparks* to play upon the area under the electrode. This method is termed bi-polar voltaization by Doyen.

The tetanic contraction of the muscles was so violent, especially when the sparks were employed, that Doyen was obliged to have constructed an apparatus that would produce a current of higher frequency than that usually employed.

A short description of the apparatus used by Doyen, and the similar one imported for test by the Research Committee of the New York Skin and Cancer Hospital, might be of some interest. It consists of a portable stand which contains rheostats, ammeter, fuses, switches, etc., from which lead the wires—one pair to a small motor and the other pair, which conducts the alternating current, to a transformer. A rolling table supports a Ferrié sparking device, composed of a large toothed wheel that is made to revolve very rapidly between two fixed copper plates connected to the source of high frequency and to a d'Arsonval condenser. The sparks pass between the copper plates and the revolving teeth of the wheel. The number of revolutions of the wheel can be regulated from

the switchboard, thus increasing or diminishing the number of sparks at will. A solenoid is placed in the circuit, and with a milliamperemeter to indicate the amount of current passing through the patient completes the outfit. Two wires lead from the solenoid, one passing to a large metallic electrode placed upon the abdomen of the patient, who lies insulated in a thick rubber pad, while the second wire passes to the active electrode.

The apparatus produces a current of about three million oscillations per second, and of a strength of from 10 to 15 amperes. If a sheet of foil be placed in the interior of the solenoid, and in the plane of one of the coils, it will be instantly melted. Employing an apparatus as described, and with the proper technic, it is possible to coagulate tissue to a depth of 5 to 8 centimeters in from one to two minutes, using a circular electrode 3 centimeters in diameter.


The electrodes vary in shape and size, and must be carefully selected for each case. Discs of different diameters are employed upon flat surfaces, as skin and mucous membrane, cylindric forms of different size for use in deep parts, and olive-shaped bodies for treating in cavities, semi-insulated in some instances for use in special situations, as rectum, in which it is necessary to localize the action without affecting the surrounding tissue.


The effect produced by placing the electrode in contact with the tissue (electro-coagulation) differs very decidedly from that obtained by allowing sparks to pass to the part (bi-polar voltaization). In the first instance, there follows a coagulation of the tissue to a variable depth, depending upon the duration of the application. The temperature within the coagulated zone reaches to from 65° to 70° C. (149°-158° F.), while beyond is an area 10 to 15 millimeters thick, in which there is decreasing temperature from the line of coagulation to the limit of unheated portion of from 65° to 38° C. (149°-100.4° F.). If, on the other hand, the method of bi-polar voltaization be employed, there is a superficial carbonization in addition to a coagulation in the underlying tissue; this coagulation, however, does not reach the depth produced by electro-coagulation. The temperature is as high as 500° to 600° C. on the surface of the carbonized area.

EFFECTS PRODUCED ON A PIECE OF MEAT IN ONE MINUTE BY
DIFFERENT METHODS.*

BI-POLAR VOLTAIZATION WITH SPARKS.

ELECTRO-COAGULATION.

Hot Air

 carbonization 600°
 coagulation 70°
 no penetration

Bi-polar Voltaization with sparks

 carbonization 600°
 Electro-coagulation 70°
 Intermediate zone
 Limit of destruction of cancer cells, below temp. of coagulation 55°
 Living tissue. 38°

Electro-coagulation

trode
 0°

tro-coagulation
 70°
ediate zone


 Limit of destruction of cancer cells, below temp. of coagulation 55°
 Living tissue. 38°

Great judgment must be exercised in employing the amount of current proportional to the surface of the electrode. If the current is too strong or the electrode too small for the strength of current, there will follow a very rapid rise of temperature, producing a desiccation of the tissue with carbonization, without coagulation in the deeper parts, while a feeble current or a large electrode will fail to produce any coagulation.

Electro-coagulation is used to destroy the neoplasms of the skin and of the mucous orifices. The technic with the proper

* Doyen, E., *Traité de Thérapeutique Chirurgicale et de Technique Opératoire*, 1910.

apparatus is simple: place the indifferent electrode in contact with the skin of the abdomen after the patient has been placed in the rubber pad. The active electrode, equal in diameter to the size of the lesion, is placed in contact with it and the current allowed to pass for from 20 to 60 seconds, which usually suffices to cause a coagulation of the cancerous mass. During the operation, an assistant keeps the electrode wet by directing a stream of water upon it. A second application at another time may be necessary if there remains any portion of undestroyed cancer. The slough produced separates in from 10 to 15 days, leaving a granulating surface. Very short sparks may be employed, but only when the lesion is quite superficial.

In treating cancer that has invaded such cavities as the maxillary sinus, in which the surface is uneven, it is impossible to avoid a certain degree of sparking; but this may be reduced to the minimum by employing the olive or cylindric electrode, which easily passes into the depressions of the part. The same technic is carried out in treatment of cancer of the buccal wall, tongue, pharynx, larynx, and of the upper portion of the oesophagus. The amount of edema following treatment of neoplasms of the buccal cavity is often so extensive as to necessitate tracheotomy.

Extreme care must be taken while treating in the neighborhood of important vessels, for fear of destroying them, although Doyen claims that the circulating blood keeps the vessels sufficiently cool to prevent coagulation of their contents. The method cannot be employed in treating cancer of the neck in the immediate vicinity of the pneumogastric nerve, for fear of a fatal result, nor can it be employed in cancer of the abdominal viscera.

In cancer of the vagina, neck of the uterus and rectum, the technic to be followed differs in no particular from that already described, except that wooden specula are employed for dilating the respective canals in place of the usual metallic instruments.

In cases inaccessible to the electrode, as cancer of the bladder, resort is made to surgery in order that the affected part may be reached by the current.

There is considerable lymphorrhoea following the application of the current, which may last for some days, and often

of such a degree as to make necessary the use of saline injections and enemata. This outflow of fluid is deemed to be beneficial, as it prevents infection and serves to flush out the tissue, thus removing cancer cells, bacteria and their toxins. Very little pain follows; occasionally a secondary hemorrhage may occur, due to dislodgment of a clot.

The success of electro-coagulation depends not only upon correct technic, but to its employment before there is an involvement of the neighboring glands or viscera.

The advantages, as summed up by Nagelschmidt, are as follows: "Electro-coagulation can be used in those tissues inaccessible to the knife; it destroys bacteria and their toxins; it is hemostatic; it favors elimination of cancer cells in the neighborhood, because of the lymphorrhea; it prevents dissemination of cancer cells during the operation for the lymph, and blood vessels are coagulated; finally, it is not specific, and results depend upon correct technic."

The reports coming from abroad of the results obtained by the use of electro-coagulation seemed to be so encouraging that Dr. William Seaman Bainbridge, Surgeon to the New York Skin and Cancer Hospital, during several trips abroad made an investigation of the method. The outcome has been the installation at the hospital of the apparatus as employed by Doyen.

During the past summer the writer, while on a trip abroad, was invited by Doyen to inspect his hospital at Paris. Doyen's collaborator, Dr. Bouchon, devoted much time to giving a demonstration of this method. The conditions treated were an epithelioma of the tongue, carcinoma of the body and cervix of the uterus and lympho-sarcoma of the thigh. A short description of the technic might prove of interest. The epithelioma of the tongue, in an adult male, was extensive, involving nearly half of the organ and extending far back to the base. The tongue was drawn forward by means of several silk ligatures passed through it, and the buccal wall was kept away from the field of operation by means of Doyen's wooden retractors, made especially for this purpose. The semi-insulated electrodes were used in order to limit the action to the area, and a current of 2000 ma. was allowed to pass. In from 2 to 3 minutes the temperature of the part had reached the necessary degree of about 53° C., and the elec-

trode was removed. The coagulated mass had a grayish color, and was firm and decidedly hot to the examining finger.

Dr. Bouchon presented the case of lympho-sarcoma of the thigh for the purpose of demonstrating that, when properly used, the method is practically painless. The patient, a young man, submitted to the treatment without an anæsthetic, either general or local, and appeared to feel no sensation other than that of heat, unless the skin was touched, and then, and then only, did he flinch. The treatment was continued for about 5 minutes, one ampere of current being used.

In simple diathermy, two electrodes of large size are employed, and so placed on the surface of the body that the current passes through the part under treatment. Contact must be perfect, otherwise there may be sparking and consequent burning. The intensity of the current and the time of contact is not limited, since the sole object is the heating of the tissue without injury.

The passage of the current through the body produces not only a local rise of temperature, but a general increase as well, accompanied by more or less diaphoresis.

Nagelschmidt reports a number of cases of Bright's disease treated by diathermy. He uses large electrodes, pressed as near the kidney as possible, and passes a current of 1500 to 2000 ma. for from 5 to 60 minutes daily for about six weeks. After the treatment has been discontinued, he notes a disappearance of the edema and a diminution in the amount of albumin. Benefit follows the use of the method in the treatment of cardiac disease, with dropsy, bronchitis, broncho-pneumonia, lumbago, joint affections, as acute gout, rheumatism and gonorrheal rheumatism.

Dr. Bainbridge will discuss the employment of diathermy for the heating of cancerous tissue in inoperative cases, in order to render the tissues more sensitive to the action of the x-ray. This claim has been made by de Keating-Hart, and the method is called by him thermo-radiotherapy.

During the past winter a large number of cases were treated by the methods herein described at the New York Skin and Cancer Hospital. It is too early to judge of permanent results, but the different methods are being used on a series of cases, which are being carefully watched by the specialists connected with the Research Department, and as soon as a sufficient length of time has elapsed to enable a definite conclusion being reached, a report will be published.

(Exhibition of lantern slides.)

Discussion of papers of Dr. Bainbridge and Dr. Russell.

Dr. George Ben Johnson, of Richmond. I feel greatly honored that I should be asked to discuss these papers, but there are many reasons why I cannot. I have come to listen and to learn. Certainly, the facts presented by Dr. Bainbridge are most impressive. I have been intensely interested in the presentation of the subject, and I look forward to the time when we shall hear even greater things of this method than we have heard to-day. I shall not trespass on your time, because I know that there are many matters that are important before you. I again express my appreciation of your courtesy.

Dr. Jefferson D. Gibson, of Denver. I would like to ask Dr. Bainbridge how he knows when he has fulgurated sufficiently?

Dr. Bainbridge. I will refer to two papers appearing in the *Medical Record* a few months ago. We simply so apply it as to allow a change in the color all the way through, so that the yellow of the fat is distinctly changed and the muscle is darkened, and the whole surface changed to a dark ham color. For a wound the size of an orange, it will require about ten minutes' fulguration. You must insulate the nerves by the special retractor, so that the charge does not get to them, because it is possible to easily shock the patient to death. If you are using it over the heart or chest, you keep it in constant motion. It is a very curious thing that if you open up a flap and fulgurate under the flap, a week or two later you will find a dry necrosis of the tissue, as if to bear out what de Keating-Hart says about the effect through the nerves. We are simply seekers after the truth underlying it.

Dr. G. E. Pfahler, of Philadelphia. I have had the privilege of seeing Dr. Bainbridge and Dr. de Keating-Hart work, and the results of the work they did are simply marvellous. The résumé he has presented is inspiring. The most marvellous of all, I think, is the neck case. I would like to make a point there. Dr. Bainbridge combined three very excellent methods—surgery, fulguration and x-ray treatment—and do not for a moment forget the x-ray treatment, because that patient had a full dose of x-ray treatment every two weeks for four months. Aside from the neck case and deep orbital case, I can duplicate every other case he has presented. I can show a recurrent carcinoma of the breast that crossed the back and involved the other breast and axilla that is to-day well, a case operated on by Dr. Edward Martin, of Philadelphia, and observed during the treatment by him. While we cannot use the third method he has presented, we still have the other two.

The fourth method I have had some experience with, that is, with diathermy, and with the desiccation, which is useful in the destruction of small epitheliomata. I have had a number of cases of epitheliomata on the tongue and under the

tongue that have healed up. I treated the enlarged glands outside of the jaw by the x-ray, and I have had some of these patients well in two or three years. So we have these other methods that we can use until we can induce hospitals to introduce the very excellent apparatus such as Dr. Bainbridge has.

Dr. A. B. Hirsh, of Philadelphia. As one of those who went to New York to see the great work done by Dr. Bainbridge, in conjunction with Dr. de Keating-Hart, I would like to call attention to one or two phases that should be of service to all of us here, and that alone would justify the trouble Dr. Bainbridge took in coming all the way to this meeting to give us this fine demonstration. One is this: he is an anatomist *par excellence*. He is a very excellent surgeon, and does not hesitate to make ample incisions and dissect out very thoroughly. That affords him an opportunity for fulguration in those desperate cases that are the bane of physicians practicing solely non-physical methods. The New York Skin and Cancer Hospital, having at the present time the only de Keating-Hart apparatus in America, affords the chance to do, through Dr. Bainbridge's courtesy, what we could not otherwise obtain—give to those desperate cases, the views of which were shown here this afternoon, an opportunity for relief from symptoms that otherwise are possible only by Betton Massey's galvanic destruction or by Nagelschmidt's thermo-penetration.

Dr. F. Howard Humphris, of London. I really haven't very much to say, except this, that the charming personality of Dr. Bainbridge puts Dr. de Keating-Hart's work in an entirely different light. The conservative way in which he puts it, "We will see in three years," is not the worst remark he has made, and I think we will be quite content to wait until that time. One thing struck me when Dr. Pfahler was talking. I went back to the book published by Dr. Massey, and it seemed to me that we had seen cases that had remained cured three years, cases in which it seemed to me this method had no advantage over the methods that have been published and used for a great many years in Philadelphia by Dr. Massey. We must have all the facts apart from the pleasing glamour and charming personality of Dr. Bainbridge.

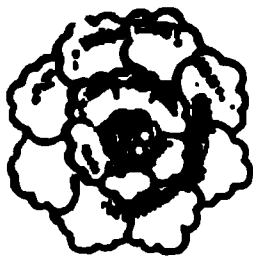
Dr. G. Betton Massey, of Philadelphia. I was present, too, on one occasion, when the delightful lecturer of a moment ago kept us until two o'clock in the morning listening and looking, and I was as profoundly impressed then when he showed de Keating Hart's work as I am to-night, when he shows his own work. I think it is interesting, also, as illustrating what I have claimed all along—that you must kill the germs, if there are germs, *in situ*. If you touch a cancer, you need to kill them *in situ*. It does look to me as if this method

does do it. I am doing some considerable work myself along this line, and I would like the doctor to stop in Philadelphia and see some cases I have done recently, serious operations on the jaw and mouth, etc. I took careful note of the very remarkable series here. I felt that I could handle all but about six or seven, but those six or seven seemed to be beyond any I had ever done.

Dr. Bainbridge. I want to thank the gentlemen for their generous discussion. In regard to what Dr. Pfahler said. You noticed he was a little hesitating when he discussed the question of the character of the epithelioma. You noticed, also, it was two or three, not five or six, cases of epithelioma. The place to see cancer is in the cancer hospital.

Desiccation, I believe, has a distinct field of usefulness, as has electrical cauterization, but I do not believe it has the same value in malignant disease where there is a tendency to pearl formation, and where there is a tendency to extend. The whole mass of evidence in the treatment of malignant disease is in favor of sedative treatment.

I do not believe that the x-ray, as x-ray, had any effect upon the man, for this reason, that he had had x-ray for four months before operation by a good operator, and it constantly kept on **growing**.



A NEW ELECTRODE.

BY FREDERICK DE KRAFT, M.D., NEW YORK.

In a paper entitled "The Static Brush Discharge Concentrated to a Blue Pencil Point and Some of Its Uses," read at the meeting of the American Electro-Therapeutic Association in 1908, we advised that a wooden electrode of some soft, porous wood which will absorb a sufficient amount of moisture be used. This electrode should have a metal point at its extremity proximal to the patient.

While this worked well if the operator kept his stick at the proper state of moisture, many have been unable to do this. Substitutes have appeared from time to time. All worked well within certain limits..

Some time ago we told the electrical engineer of Van Houten & Ten Broeck Co. of the trouble many men had and suggested that a better electrode would be welcomed by all.

After some experimenting, he succeeded in constructing an electrode composed of different minerals which gave a beautiful brush discharge under all conditions, but it heated up badly; so much so, that it took some minutes after its use before we could touch it with our bare hands. The discharge was also a little coarse.



Van Houten & Ten Broeck Co., N. Y.

• NEW BRUSH DISCHARGE ELECTRODE.

He has now perfected an electrode which we believe to be perfect. The blue pencil flame is long and soft, or can be made short and hot and no fear of a stray spark leaping from it need be entertained. It is well made and not fragile.

We believe that more men will employ the static brush discharge from now on.

The use of the brush discharge is especially to be recommended after the employment of the high candle power lamp and the d'Arsonval current in gouty and rheumatic conditions. We need hardly recount the manifold uses of the static brush discharge in the treatment of old ulcers, in herpes zoster, in inflammatory conditions in neuralgia and neuritis.

The first effect of the application of the blue pencil flame is a blanching of the skin, followed later by an increase in color due to dilatation of the arterioles. There is felt an inclination to drowsiness, to be followed an hour or two later by positive irresistibility to sleep.

If the current is applied to the upper part of the spine many of the more observing patients will tell you that they observe a metallic taste on the tongue and that the saliva has a tendency to fill the mouth. Repeated applications along the entire length of the spine and over the abdomen increase peristalsis of the intestines, as is shown by freer and softer stools. At the end of a seance lasting from ten to twenty minutes the patient will be warm and very often bathed in a gentle perspiration.

The brush discharge applied a few times will have a tanning effect on the skin. This is due to the ultra-violet and blue-violet rays in which it is very rich.

Probably no agent now at our command is so rapidly efficacious in relieving the swelling and pain of sprained ankles and other joints as the static brush discharge. Its use over the bare skin of the back in neurasthenia and in insomnia will be gratifying to many a patient and his physician.

No resonator discharge has ever succeeded, and we firmly believe, never will succeed in supplanting the brush discharge derived from a static machine in its own peculiar field of usefulness. The softness of the blue pencil flame or the sputtering brush discharge will always be a matter of wonder and delight to the man who has never seen or felt it, and to the expert operator of a static machine.



**COMMITTEE REPORT MECHANICAL VIBRATION
THERAPY, EXCISE THERAPY AND
APPARATUS.*****BY F. H. MORSE, M.D., CHAIRMAN.**

The Committee has nothing new this year to report in the way of new apparatus, and my associates have not sent me anything for the report; therefore, I have only to say that mechanical vibratory stimulation is considered by those who from long use have found it an important part of their office equipment, and will be likely to consider its use a valuable therapeutic power until something better is substituted.

The empirical methods of the average osteopath in the treatment of visceral derangements by spinal manipulation have, of course, an element of truth. In the recent teachings of Dr. Abrams, in which he has systematized what he calls "Spinal Therapy," not only for application for the treatment of all disease, but for diagnosis and prognosis as well, he lays great stress on concussion of the spinous processes, while the writings of Doctors Arnold, Snow, Pilgrim and others, have especially emphasized the importance of making the mechanical applications to the lateral spinal nerve exits controlling the part of the anatomy intended to be treated. The careful clinical study of the different methods will in time evolve the truth, so that this valuable therapeutic means may become of more and more importance.

Discussion.

Dr. Rosa D. Wiss. of Meridian, Miss.: I want to thank Dr. Morse for the report he made last year. He seemed to think that it was very insignificant and very unimportant, but it put me to thinking, and I have done a good deal more in this line than I ever did before, and it was because he taught me that last year. I do not want him to think when he makes short reports there is no good in them; for there is good in them.

Dr. Arnold Snow, of New York: I can add but little to Dr. Morse's report in general, except to say that some progress has been made in the use of mechanical vibration for lowering or raising blood pressure, according to the pathological indications to be met, and also for lowering the pulse rate, and for reversing conditions where the patient has a higher pressure lying than when sitting, or a higher pulse rate lying than when sitting. When these conditions are reversed the accompanying symptoms are relieved. I think all those who will take the trouble to investigate mechanical vibration along those lines will feel amply rewarded.

On motion the report was accepted and placed on file.

* Read at the Twenty-second Annual Meeting of the American Electro-Therapeutic Association, at Richmond, Va., September 3, 1912.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M.D.

Some Results of the Treatment of the Baltimore Drinking Water by Calcium Hypochlorite. By William Royal Stokes, and F. W. Hatchel. *Journal A. M. A.*, October 26, 1912.

A great many articles are now appearing upon the question of the destruction of pathogenic bacteria by chemical means, especially calcium hypochlorite. We have recently reviewed the question of the action of this chemical upon the water of bathing pools and tanks, and will now consider its action in sterilizing water for drinking purposes. After reviewing the physical location and mechanical methods of obtaining the water for Baltimore, and explaining its method of impounding, the author has described their examination in detail, the chemical and bacteriological tests made, and given much data in the form of tables, etc. Eliminating all details, it may be stated in general terms that the best results in the elimination of the various organisms, from the storage reservoirs and the city taps, were obtained after the hypochlorite had been increased so as to represent 1.0 part of available chlorine per million parts of water. There was a marked reduction in typhoid fever and other bacterial diseases, so that the author has come to the conclusion that the hypochlorite treatment produced a marked diminution of the bacterial content of the water treated. The treatment also produced an invariable reduction in the percentage of positive tests for the colon bacillus. He finally remarked, however, that no final conclusion should be drawn until the method has been employed for several years.

Psoriasis—The Value of Baths and of Maceration in its Treatment. By Douglas W. Montgomery. *Journal A. M. A.*, October 26, 1912.

Montgomery briefly reviews the physiology of the skin, as an enormous gland enveloping the body, and states the well known fact that water has a powerful influence on the cutaneous surface. Moist heat and warm water are the best means of securing drainage of this gland. When maceration is carried still further, the whole horny layer may be lifted off in sheets, exposing the pink, tender quick, which often appears in the "washwoman's hands."

It was von Zumbush who said that water is the oldest and most effective means we possess, and without water baths,

psoriasis is a most difficult disease to manage, and that in this disease we should avoid extremely cold baths and, as a rule, prefer warm ones, in fact, even moderately cool and cold baths are not as efficient as the warm. As maceration and the drainage of the skin is of the first importance in the treatment of psoriasis, the longer the bath the better the effect. To this end, the continuous baths of an hour or more have been employed. While they possess many advantages in the treatment of the skin lesion, there are few who are strong and active that will devote the necessary time, while others cannot stand the prolonged or continuous bath without fatigue and detriment to the general health.

In addition to the bath we may employ green soap with a rather stiff brush, pumice stone or hand sapolio. The rubbing should be sufficient to remove considerable of the epidermis, and even if the surface bleeds, it may be advantageous in reducing congestion, provided an antiseptic application is made after the bath to prevent infection.

Montgomery is very skeptical as to the value of mineral or medicinal baths, and in this, the editor agrees, with one exception, viz.: potassium permanganate, two tablespoons full of the saturated solution being added to the warm bath. It should be noted in passing that this solution must be made fresh. The patient should remain in the bath of this character ten to twenty minutes. In addition to its macerating properties, the immersion of the body in pure water and bringing it into contact with animal cells, powerfully induces them to give up their products of waste tissue change, and this effect is obtained in the bath treatment of psoriasis.

The most amusing instance of maceration occurring in my experience, occurred in a burly, self-indulgent coachman, with a splendidly developed muscular system. It is astonishing how frequently patients with psoriasis have these fine muscles. It is an old observation that psoriasis occurs in the well nourished. This man had a psoriasis in the soles that defied every means employed against it. One day he turned up, showing as fine a pair of soles as I have ever seen, and gave the following account of himself:

While hosing down carriages he wore a pair of rubber boots. After finishing his work he went out to get a drink, and one led to another until he ended in a glorious spree, and remained in that blissful state for one entire week. During the whole of this time he did not once remove his rubber boots. When he finally sobered up and pulled off his boots, the whole macerated outer epithelial covering came off too, leaving his feet as soft and tender as a baby's. He did not tell me what he did with the boots."

This method has been utilized frequently by von Hebra, but it goes without saying that the bath is decidedly the best measure.
(C. P.)

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

The Role of Physico-Therapeutics in Dermatology. Editorial from *American Journal of Dermatology*.

To those who have watched the progress of dermatology during the last couple of decades it is self-evident that the advances it has made are almost entirely due to the introduction of therapeutic agents other than mere ointments and lotions.

It is now hardly possible to conceive of an up-to-date dermatological clinic without its associated electrical and radiographic department, not to mention radium-therapy and the means for the production of extreme degrees of cold.

All these accessories are taken for granted, and, though it is easy to be somewhat over-enthusiastic regarding their value, yet it cannot be denied that the use of all these newer agents at the right time and in the right place has achieved results unattainable by any other means.

In some quarters a reaction against physical methods has already set in, but this phase of activity is a natural outcome of the introduction of any new system of therapeutics, and it need not cause any alarm among the devotees of physico-therapy.

Things will adjust themselves, and, in fact, are so doing, all in good time.

It is always a good plan, however, to take stock of the situation, and to inquire carefully into the present position and value of any new method of treatment.

Such a review has been recently undertaken by Sir Malcolm Morris with regard to physico-therapeutic methods in dermatology, in a paper presented to the Seventh International Congress of Dermatology at Rome, April, 1912. (*British Journal of Dermatology*.)

Dealing with lupus vulgaris, which has always lent itself especially to innumerable modes of treatment, Sir Malcolm Morris considered that in this disease are illustrated the greatest triumph of physico-therapeutic methods.

The Finsen light will sometimes work wonders in the non-ulcerating variety, especially for small areas.

For ulcerated surfaces and for larger areas the x-rays are most serviceable, though in both groups the treatment may need to be reinforced by the use of the cautery or by some ointment containing a keratolytic agent, such as pyrogallol or salicylic acid. In the case of quite superficial lesions, applications of solid carbon dioxide may be recommended, while radium is also useful in many stages of the disease.

Lupus erythematosus reacts particularly well to carbonic acid snow, several short applications being preferable to one longer one.

This method may be said to take precedence, as far as results go, over treatment by ionization, though some observers claim to have obtained better cures by means of cataphoresis.

The only disadvantage connected with solid carbonic acid is the pain and blistering which it causes in many cases, though it must be admitted that very few persons really object to the applications on this account. For warts, moles, nævi, and lupus nodules, it is one of the most useful of all remedies.

The Finsen light has the conspicuous merit of leaving a most excellent scar. It also possesses the advantage of requiring no anesthetic.

The tediousness of the applications and the great expense of the plant and working render this method less successful than it would otherwise be.

The x-rays, however, have rendered inestimable service to dermatologists and to surgeons in the treatment of inoperable cancer, mycosis, fungoides, lupus, leprosy and ringworm, intractable cases of pruritus, psoriasis and hyperidrosis.

They are also useful in mucous membrane lesions.

The drawbacks of x-rays are their liability to produce pigmentation, or atrophy of the skin, teleangiectasis, or even epithelioma, after strong and oft-repeated applications.

The two positive advantages claimed for radium are its painlessness and its selective action whereby it exerts its influence without destruction of surface.

It can be inserted inside cavities and tumors, and left inside for long periods without requiring much attention.

Its great expense, of course, militates against its general use.

Finally, it may be said that all these agencies have a distinct and conspicuous place in the armamentarium of the modern dermatologist.

The writer of the above article forgot to mention one of the most valuable modalities we possess in the treatment of skin diseases—the high-frequency currents. The d'Arsonval current for the correction of metabolic disturbances. Its well known effect upon the circulation, relieving hypertension and reducing the blood pressure in the arterioles, thereby relieving congestions and inflammatory conditions of the skin. It eliminates toxins from the system, acts upon the vasomotor system most strongly, and stimulates general nutrition.

The applications of the low vacuum, high-frequency tube

for acne vulgaris and chronic eczema is one of the most beneficial effects known. The germicidal action of the high-frequency effleuve is the best treatment known in indolent ulcer, and suppurating conditions of all kinds.

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERIC DEKRAFT, M.D.

Electrical Treatment of Arterial Hypertension. By John H. Burch, M.D.

The writer calls attention to three factors which are very important: (1) The ventricular systole; (2) the peripheral resistance, and (3) the elastic recoil of the arteries.

Anything that impedes the current of blood after it leaves the left ventricle offers peripheral resistance, such as contracted kidney, narrowed or obliterated blood vessels, friction or gravitation.

In the majority of incipient cases this is due to vasomotor constriction due to toxins, various reflexes, and psychic influences. These stimulate contraction of the peripheral blood vessels. In true arterial fibrosis the power of recoil of the arteries is lost or impaired. Here the walls of the blood vessels impede the flow of blood. So long as the power of the heart is sufficient to compensate for this increased peripheral resistance a fair standard of health may be maintained. When myocardial or coronary arterial degeneration breaks this cardiac compensation Nature may make one more "effort to restore, for a time, compensation. This is done by vaso-constriction of the arterioles, thereby increasing peripheral resistance. When this event occurs we are dealing with a latent break in compensation that may not be manifest." Great harm may be done in these cases by the forcible reduction of the arterial tension.

Normally there is a difference of from five to 30 millimeters in the blood pressure when taken in the recumbent and erect posture. If there is vasomotor insufficiency, it will be found that the arterial tension will not be proportionately greater as it should be when taken in a standing position.

If this is due to splanchnic vasomotor ataxia due to enterotoxins, by forcibly supporting the abdominal viscera by traction upward upon the abdomen, it will cause the arterial tension to rise in the standing position. The same result may be achieved by forcible concussing the spinous processes of the first, second and third lumbar vertebra. This will cause

a vaso-constrictor reflex of the splanchnic vessels, thereby augmenting peripheral resistance.

If cardiac compensation is broken there will be a rise of arterial tension in the standing position.

If the arterial recoil is impaired there will be but little difference in the standing and recumbent position. If we first take the blood pressure in a sitting posture, and immediately have the patient inhale from a bottle sufficient amyl nitrite to cause a flushing of the face, a momentary drop in blood pressure will be immediately followed by a rise of systolic pressure of from 3 to 5 mm. If instead of elevation in blood pressure a distinct fall occurs it is pretty certain that we have a failing ventricular compensation. If there is no change in the arterial tension after the inhalation of amyl nitrite, it would prove impaired arterial recoil and probably arteriosclerosis or fibrosis, but it would also indicate that the ventricular compensation was not broken and benefit might be expected from lowering the peripheral resistance. If after the administration of amyl nitrite the blood pressure rapidly falls, causing more or less depression, it is best not to interfere with the peripheral resistance, that is trying to compensate for a broken compensation. Some patients with very high arterial tension will show a drop of from 10 to 30 millimeters in a ten-minute seance when subjected to almost any form of high potential discharge. In other cases there would be but a very slight fall and in a third class of cases no change at all.

In testing these cases, the patient was seated in a chair upon an insulated cushion that was placed upon a plate of metal that was attached to one extremity of a Tesla coil, while the subject held a small hand electrode connected to the other end of the apparatus. The output of this apparatus is from 20 to 50 milliamperes. If the patients who were not affected by this method were connected to a small d'Arsonval solenoid in the same manner and subjected to a current of from 200 to 800 milliamperes, there was a very appreciable drop in blood pressure.

If the patients who showed a slight change in arterial tension when connected to the Tesla coil were subjected to the discharge of the more powerful transformer there would be, in almost every instance, a very marked fall in blood pressure, that was at times rather alarming, as it seemed to cause symptoms of collapse that in several instances continued several days.

It would seem that when the blood pressure is rapidly reduced by a very mild discharge from a Tesla coil we are dealing with increased peripheral resistance of presumable vasomotor origin.

If these weaker currents slightly affect arterial tension we

are dealing with broken cardiac compensation that had better be left alone. In those that are not all affected by the small output of the Tesla coil, we may assume imperfect elastic recoil of the blood vessels and increased peripheral resistance. Much good may be done in these cases by electrical treatment.

Priority of Discovery of Heat Production of High Frequency Currents.

In a communication to the editor of the *London Lancet*, December 14, 1912, by Dr. Damoglou, of Cairo, we find the following statements, which confirm what many of us have been cognizant of for a long time:

Diathermy is not a novel method as Dr. Nagelschmidt would have us believe.

Dr. Damoglou stated during the discussion of Nagelschmidt's paper at the Sixth International Congress of Medical Electrolgy and Radiology last October, at Prague, that the thermic action of high frequency currents was made known by d'Arsonval in 1901.

Dr. Bonnefoy reported many clinical cases since 1903 in *Annals of Electrobiolgy* in which the thermic effects of d'Arsonvalization were proven.

In 1905 he presented a communication to the British Electro-Therapeutic Society in which he confirmed the first.

Subsequently Dr. Sommerville, of Glasgow, undertook his thermometric researches which proved the influence of high frequency currents in the elevation of temperature. Dr. Bonnefoy in his book on arthritism says that the sensation of heat can be obtained after many daily applications. He also says that if after 15 or 20 days' treatment heat is not felt, he makes two applications daily.

Prof. Donmer made the statement at the congress in Barcelona that the condensator bed seemed to him doomed.

This led Damoglou to think. Having failed to warm his patients on the condensator bed during the previous four years he adopted the following method:

He connects the patient to one side of the solenoid by means of a bifurcated cord to handles which are held in the patient's hands. The other side of the solenoid is attached by a single wire to a metal plate fixed on a woolen blanket on which the patient places his bare feet.

This gives a sensation of heat in the arms exactly as with the special apparatus of Reinger, Gebbert and Schall.

We find it recorded that when d'Arsonval and Charrin experimented upon the effects of high frequency currents on pathogenic micro-organisms *they found it necessary to keep the v-shaped tube which contained the diphtheritic toxin in a*

refrigerating tank in order to prevent the *heat engendered by the passage of the current* from complicating the results. This is to be found among the earliest of d'Arsonval's communications.

Nagelschmidt probably coined the word "diathermic." His papers no doubt served to stimulate others to action. The apparatus he employs—a transformer which supplies a pair of condensers and a Telefunken type spark gap having 3 gaps—undoubtedly gives a current of greater frequency than the older type of induction coil and their troublesome electrolytic interrupters. The newer apparatus, step-up transformer supplied with multiple spark gap, which can now be obtained in this country, we believe to be superior to Nagelschmidt's. We believe that the technique employed has much to do with the amount of heating of the tissues. While a very thin dielectric will give a very much higher milliamperere meter reading and a very rapid heating of the body, even to the point of profuse sweating, it gives none of that peculiar quiet sense of delightful restfulness which a patient experiences on a couch with heavy dielectric. The general diffusion of pleasant, most agreeable warmth is more pronounced when a heavy dielectric is employed. This also allows of the freest dissipation of heat from the body. (F. DeK.)

TRANSLATIONS.

EDITED BY EDEN V. DELPHEY, M.D.

Dilatation of the Stomach and the Physiotherapeutic Means to Combat it. By Drs. G. Leven and G. Barret. *Archives d'Electricité Medicale*, June 25, 1912.

The authors have studied the positions of the stomach in the normal and in the pathologically dilated condition by means of the x-ray accompanied by the ingestion of bismuth. In order to thoroughly determine the shape and position of these stomachs, the observations were made in both the upright and prone positions. The normal stomach, when examined in the upright position presents the form of a vertical tube terminating inferiorly in a horizontal or slightly ascending segment which corresponds to the pyloric region. Three portions may be distinguished: a superior portion, sub-diaphragmatic, of an ovoid form, and corresponding to the cardiac end, partially filled with gas; an almost vertical intervening segment whose sides are practically parallel; and an in-

ferior portion extending in a transverse or slightly ascending direction, and which corresponds to the pyloric end of the stomach. The stomach is entirely situated in the left hypochondriac region, its right border being generally at a distance from the median line which it nowhere reaches except that it sometimes touches it at its junction with the duodenum. Its inferior extremity is generally in the neighborhood of the umbilicus, this level being made clear by the crests of the ilia, and may vary three or four centimeters without indicating a prolapse. The normal length of the stomach varies from fifteen to twenty centimeters. In the prone position, the whole stomach is shorter and situated higher as indicated in Fig. 1. The definition of a normal ston-

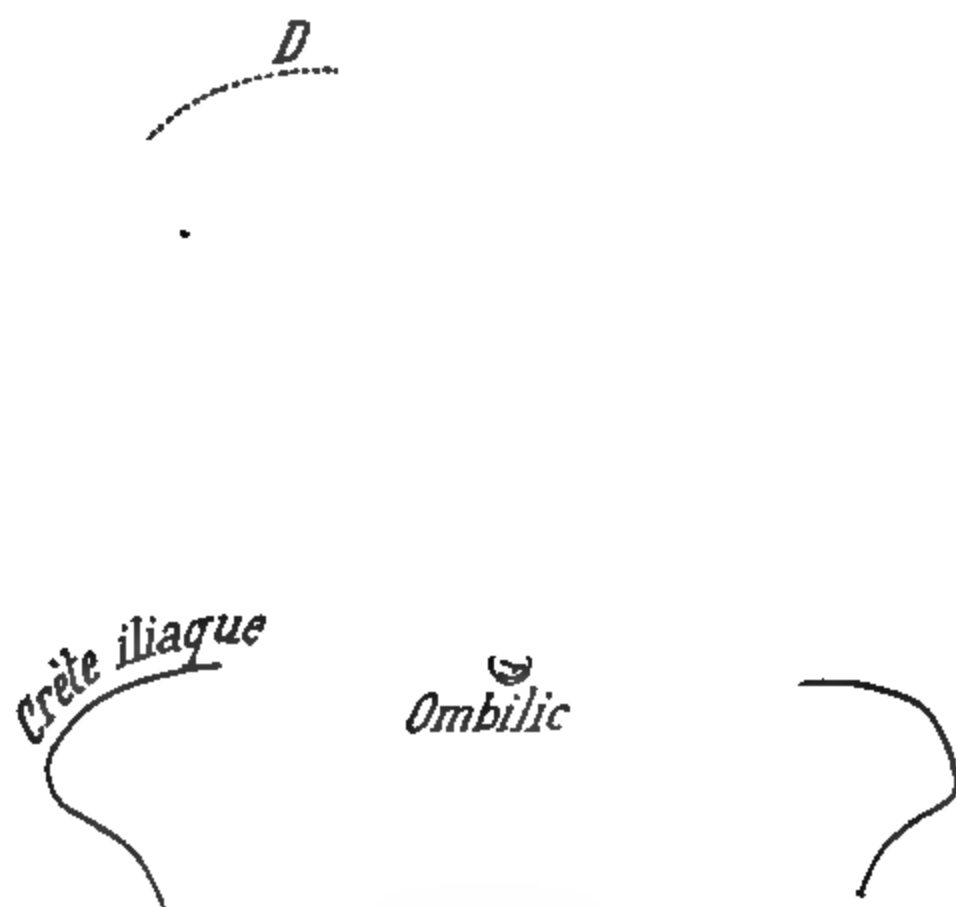


FIG. 1. NORMAL STOMACH.

ach does not depend entirely upon its size and location, but how it acts in relation to its contents. Except for the pouch of air in its cardiac extremity, the non-functionating stomach is empty, and, when partly or wholly filled, adapts itself to its contents. Its inferior extremity remains relatively fixed but it increases laterally to accommodate its contents. This manner of filling is an expression of its tonicity, and when finally it is distended to its full capacity, it is the chamber of air which is lessened. This tonicity distinguishes the

normal from the spasmodic stomach, and from the dilated stomach, in which latter it is almost if not entirely wanting. These different degrees have been classified as: hypertonic, orthotonic, hypotonic, and atonic. These are entirely theoretical, for the conditions gradually merge from one into another. The mode of filling is an essential element which characterizes the dilated stomach. Fig. 2. It fills like a vase



FIG. 2. DILATED STOMACH.

or bag; the material accumulates in the bottom passively distending the portion which it occupies; its level rises as the amount of material increases while the base may descend, weighed down by its contents until it descends into the true pelvis and measures thirty to thirty-five centimeters in length. The median portion of such a stomach is drawn together in the process of elongation so that there seems to be a constriction, and under the radioscope this will be seen to disappear when the entire stomach is raised up by the hand from below. When the pyloric segment descends with the rest, the stomach easily empties itself, but when as is often the case, it is more or less fixed, the contents of the dilated stomach must rise, before emptying, to the pyloric level, which it is not easy for it to do. While the conditions given above

show that the upright position is the best for examining the dilated stomach, yet valuable facts may be learned by examining the patient while lying on the back. In this position the stomach and its contents spread out and glide about one upon another over the plane of the surface upon which they rest. The following facts may be learned: displacement of the gastric contents themselves in the cavity of the stomach; displacement of the stomach in the abdomen; displacement of all the abdominal contents together. Normally the displacement of the orthotonic stomach is limited to moving it about for a couple of centimeters; but the dilated stomach, which is also usually contained in a cavity with flaccid walls will admit of very extensive changes in both form and direction. While the radioscope enables the investigator to diagnose exactly the size, shape, location and movability of the dilated stomach, the pain-signal will also give valuable evidence. This signal depends on the fact that when there is a dilatation and prolapse of the stomach, there is a hyperaesthesia of the solar plexus, due to the dragging on the nervous filaments. This danger-signal is elicited in the following manner: the examiner places himself behind the patient and with his right hand tries to determine the most painful portion of the abdominal region; then with the ulnar border of the left hand he examines the entire surface of the abdomen to find the lower border of the stomach and, on doing so, raises it upward toward the epigastrium, when the pain caused by the pressure of the right hand is relieved. Also if he suddenly lets go the support, the patient feels as if the entire contents of the abdomen were dropping. The aspect of patients suffering from dilatation of the stomach is characteristic: cheeks wrinkled and pale, eyes sunken and surrounded by dark rings, rapid and weak pulse; they complain of weakness and indisposition to exertion, of pain and distress in the epigastric, and perhaps the whole abdominal region. These conditions are due to two causes: traction on the solar plexus and auto-intoxication from stasis of the stomach contents. The treatment consists of more or less prolonged rest in bed, support of the dilated stomach by a pad, regulating the patient's *prima via*, improving the general nutrition by careful feeding in which they have the patient take 200 cc. of liquid one-half hour before eating, and about 100 cc. during the meal, and not to take any other liquid during the five or six hours of digestion.

BOOK REVIEWS.

A TEXTBOOK OF PRACTICAL THERAPEUTICS, with especial reference to the Application of Remedial Measures to Disease and Their Employment Upon a Rational Basis. By Hobart Amory Hare, M.D., B.Sc., Prof. of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia; Physician to the Diseases of Children in the University of Pennsylvania; Laureate of the Royal Academy of Medicine in Belgium, of the Medical Society of London; Member of the Committee of Revision of the United States Pharmacopœia of 1905. Fourteenth Edition. Enlarged, Thoroughly Revised, and Largely Rewritten. Illustrated with 131 Engravings and 8 Plates. Lea & Febiger.

In this, the 14th edition of Dr. Hare's work, the text has been thoroughly revised and much new matter introduced in an endeavor to include all that is valuable in the methods of employing both old and new remedies. A new introductory chapter has been prepared and text dealing with the use of salvarsan and tuberculin, along with a description of Bier's method of treatment for the induction of artificial hyperemia. The work has treated the subject of drug therapy in the usual manner, devoting about 500 pages to its consideration.

When, however, the writer states that he has endeavored to include all that is valuable of both old and new remedies, he has manifested his true attitude as towards physical methods. The use of cold and somewhat of heat, including Bier's method, together with exercise, counter-irritation and diet, have been modestly considered; whereas, the employment of radiant energy, the uses of electricity, vibration and some valuable measures employed often by irregulars, have received no recognition. This is representative of the status of the author's progress in this direction. It is hopeful that in the next edition, in that he has publicly asserted his recognition of these measures, they will receive a more general treatment.

The work, as a whole, is representative of the present progress of the medical teaching body from the point of view of the rank and file of American physicians, but not representative of the progress already made in physical therapeutics. It is, however, the most progressive work of its kind.

The publishers are with this work, as with their other publications, to be congratulated on the excellent quality of the printer's work.

The Journal of **Advanced Therapeutics**

VOL. XXXI.

FEBRUARY, 1913.

No. 2

Edited by DR. WILLIAM BENHAM SNOW

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DUAL POLARITY OF ELECTRICITY.

The one polarity theory of Franklin and the later statement of Sylvanus Thompson, made in connection with the electron theory, assume that there is but one electricity—negative—as manifested in the phenomena of the passage of the negative electrons in the vacuum tube.

Sir William Ramsey, during the past autumn in a lecture delivered in Philadelphia affirmed this theory, following which there has been some controversy as to its correctness.

This view may be acceptable to the engineer or the physicist who studies the effects upon inert matter, and particularly as to its passage over metallic conductors or as studied in the arc from a Rhumkorff coil or other powerful exciter. No physician, however, who is conversant with the different effects of the two poles upon living tissue, or who studies the discharges from high potential sources of lower amperage can understand how such a theory ever became dominant in the minds of such eminent authorities.

In order to justify a contradiction to the views expressed, the opinion of one of the ablest authorities on electro-physics has been obtained. He writes as follows: "Assume a circuit carrying an electric current to be partly metallic and partly gaseous. There is ample evidence of a progression of positively charged carriers in one direction in the gas, and of negatively charged carriers in the opposite direction in the gas. To my knowledge there is no evidence of the former in metals but there is of the latter."

This reply justifies the assumption that physicists may have

been mislead by the study of the currents in connection with metallic conductors, or as previously stated, from observation of arcs of large amperage in which there can be no evidence of difference in the appearance of the discharges at the opposite terminals. The discharges from the terminals of a static machine, however, or photographs of discharges that have been projected from the opposite terminals upon sensitized plates show a very marked difference in the character of the discharges. The difference as observed from a modern Holtz static machine is remarkable. The brush of straight divergent lines starting out from the negative pole and the large luminous ball surrounding the positive pole when the poles are widely separated in a darkened room are distinctly different in appearance, as are also the streams of light going to the negative collectors within the machine, as compared with the little bright dots or spots on the points of the collectors on the positive side.

The fact that it is necessary in the generation of a current with the Holtz machine to separate these opposite polarities with connected collectors on opposite sides as neutralizers, would not be necessary if there were not in fact two opposing entities, than that one was called "non-charged atoms," as opposed to negatively charged atoms. Other phenomena, distinctly different, are apparent at the opposing terminals of the spark, passing between the positive and negative sides of a Holtz machine, by which are definitely indicated the positive and negative poles.

Furthermore, the application of electricity to living tissues from the two opposite sides of a Holtz machine produce effects distinctly different. The different phenomena of the directional and oscillating currents as shown in the oscilloscope, under certain conditions appear to be distinctly unibipolar from either side of the machine. These static phenomena render impossible the reconciliation of the one polarity theory.

Again, with the constant current, the effects of the opposite poles are also distinctly different in their chemical constituents and in their effects upon the tissues. At the positive, oxygen is set free and at the negative, hydrogen. The positive pole becomes dry, and the negative moist. The positive pole is acid, and the negative alkaline.

The negative current of electrons are manifested in the attenuated gases; and it may be safe to assume that positive electrons "abhor" such attenuation; which may explain the production of the x-ray instead of the otherwise electrical decomposition which takes place when the two opposite discharges come together under other conditions.

"The ultra violet rays of the sunlight," says Sir Oliver Lodge, "will discharge a negatively charged electroscope, but will not discharge one positively charged." Is it not possible that the sunlight ionizes the air conducting the negative electrons up to the rarer media of the earth's atmosphere? And is it not also possible that the previous opinion that the earth was negatively charged may be disproved as was the direction of the current, which was previously supposed to pass from positive to negative, but is now demonstrated to pass in the opposite direction? The phenomena of the passage of the negative electrons into a vacuum tube which is the same whether the current passes through a wire leading into the tube or through the glass wall of the tube, indicates a remarkable affinity of the negative current for an attenuated media.

There seems to have been many fallacies in the theories of the past, and there also seems to be some fallacies in the theories of the present, which is not an unusual thing in a science so far from its absolute solution as is that of electrical science. The marvelous affinity of two oppositely charged fields are undoubtedly the sources which give electricity its great working power from their attraction for each other, which result either in work done or heat produced in metallic conductors or a transformation into other forms of energy, as heat, nitrous oxides, and H_2O , in the gaseous media.

Hydrogen, it is a determined fact, has been resolved into negative electrons. If oxygen should be resolved into positive electrons, it would reveal a remarkable consistency in the physics and chemistry of electricity. If this should be accomplished it would finally determine the controversy as to a dual polarity and make more stable the science of the relation of matter and energy.

THE SEVENTEENTH INTERNATIONAL CONGRESS OF MEDICINE.

The Seventeenth International Congress of Medicine will meet in London, England, from August 6 to 12, 1913, under the patronage of the King of England.

The *personnel* of the officers of the congress has not been altered since January, 1912, but a few names have been added to the vice-presidents of the sections.

The arrangements for the general sessions are as follows:— A general session will be held in the Albert Hall on each day, except Saturday, during the Congress, at 5:30 p. m. The following general addresses will be delivered: Wednesday, August 6, Address in Medicine, Professor Chauffard, of Paris.

Friday, August 8.—Address in Pathology, Geheimrat, Professor Paul Erlich, of Frankfort.

Tuesday, August, 12.—Address on Public Health, Right Hon. John Burns, M.P., President Local Government Board; address in Surgery, Professor Harvey Cushing, of Harvard University; address on Heredity, W. Bateson, F.R.S.

The Program for the Section in Dermatology and Syphilography will be as follows:

Thursday, August 7,—1. Epithelioma of the Skin, Benign and Malignant. *Reporters:* Dr. J. A. Fordyce, New York, U. S. A.; Professor Dr. J. Jadassohn, Berne. A paper will also be read by Dr. Jean Darier, Paris.

Friday, August 8.—2. Alopecia Areata and Allied Conditions. *Reporters:* Dr. R. Sabourand, Paris; Dr. P. G. Unna, Emsbuttel-Hamburg.

Saturday, August 9.—3. Syphilis: Its Dangers to the Community, and the question of State Control. (Jointly with Section XIX.) *Reporters:* Professor Dr. Ernest Finger, Vienna; Professor Dr. Edmund Lesser, of Berlin.

Monday, August 11.—4. The Treatment of Syphilis by Salvarsan and Allied Substances. (Jointly with Section XX.) *Reporters:* Professor Dr. Erlich, Frankfort; Major T. W. Gibbard, R.A.M.C., conjointly with Major L. W. Harrison, R.A.M.C.; Professor L. A. Neisser, Breslau; Professor Venin, Paris.

Tuesday, August 12.—5. The Vaccine Treatment of Diseases of the Skin. *Reporters:* Professor T. C. Gilchrist, Baltimore, U.S.A.; Professor Arthur Whitfield, London.

The Section of Radiology is as follows

1. The Radiotherapy of Malignant Disease. *Reporters:* Dr. Robert Rienbock, Wien; Dr. Robert Abbe, New York.

2. The Radiography of the Stomach and Intestines. *Reporters:* Dr. G. Holzknecht, Wien; Dr. C. L. Leonard, Philadelphia.

Friday, August 8.—3. The Radiography of the Chest. *Reporters:* Dr. Hugh Walsham, London; Professor Dr. K. F. v. Wenckebach, Strassburg.

Monday, August 11.—4. Roentgen and Radium Therapy in Gynecology. (Jointly with Section XIII.) *Reporters:* Dr. Foveau de Courmelles, Paris; Professor Dr. Bernh. Kronig, Freiburg Br.; Professor Dr. Albers Schonberg, Hamburg.

Tuesday, August 12.—5. The Radiography of Bones and Joints and its Value in Orthopædic Surgery. (Jointly with Section VII. a.) *Reporters:* Dr. Fedor Haenisch, Hamburg; Dr. Nove-Josserand, Lyons; Dr. P. Redard, Paris.

Dr. Foveau de Courmelles of Paris has sent out very general requests for those who have anything to offer upon the subject of Roentgen or Radium Therapy in Gynecology to communicate with him, as he is very desirous of collecting all the information possible on this subject, for presentation at the Congress.

It is a source of regret that this Congress has not also a Section of Electro-Therapeutics or Physical Therapy. The same oversight has been made here as in the Congresses and Meetings of Societies in our own country. This important branch of medicine has too often been neglected, and it is hoped that arrangements may be made at this session for a Section in Physical Therapeutics at the next Congress of Medicine.

All applications for membership should be made to the General Secretary at the offices of the Congress, 13 Hinde-Street, London, W. Subscriptions: Five dollars. Ladies half price.



LESSONS FROM FAILURES.*

*(On Apprend En Faillant.)*BY F. HOWARD HUMPHRIS, M.D. (BRUX.), F.R.C.P. (EDIN.),
LONDON.

When reading various books and articles (and I do not except my own) written on electro-therapeutics, one might almost imagine that failures were not encountered in this branch of medical healing, and it may so be that in early training under masters of this branch of medicine, the learner sees no failures. Even perchance in his early days of practice, following closely in the footsteps of his teacher, the beginner knows "no such word as fail"; and though this may be true of the lexicon of youth, in the dictionary of a well-spent middle-age the word does occur from time to time. And it is well that this should be so. Samuel Smiles truly said, "We learn wisdom from failure much more than from success; we often discover what will do, by finding out what will not do, and probably he who never made a mistake never made a discovery."

I propose in this short essay to draw lessons from failures in my own practice rather than to dogmatise about failures in general. Some of my early failures I now know were due to the causes which are obvious and elementary, viz.: lack of a full armamentarium and of an adequate knowledge of how to use what I had. Certain it is that a full armamentarium adds not only to the comfort of working, but also to the percentage of success. How should we expect to stand in the front rank of medicine if we were limited in our prescriptions to three or four drugs? We should certainly get results if we had only castor oil and opium—and I can think of no more useful couple—but we should not get that percentage of successes in all cases in which we might hope for it with all of the drugs of the pharmacopœia at our disposal. Similarly it may be argued that even with all these resources, they would avail but little unless there were a careful training and study in the scientific use of them. It may be said that these are platitudes, but I have known a case where a high frequency apparatus was ordered and the treatment was going to be given by an operator who up to

* Read on September 4, 1912, before the fourteenth annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

the hour of his starting the appliance, had never seen high frequency, or any form of electricity administered. I will admit this is an extreme case, but I know of other cases where electricity is administered with a lack of knowledge of its administration with which a drug would not be touched. And the public will, with equal devil-may-care feeling, go to an "electric establishment" and allow unqualified people to administer that powerful agent—electricity—an agent which they know is capable of killing them, when they would certainly not allow any but the most carefully selected physician or surgeon to attend them for ailments however trivial. But the lesson to be drawn from this last is, I fear, not for this day or generation.

Perhaps one of the most frequent causes of failure is the undertaking of cases unsuitable for treatment by electricity. In 1904 I was having an unbroken run of success with the treatment of chronic constipation by means of static electricity and I was getting the belief that it was an infallible remedy when I undertook the case of a lady and failed to effect the desired result. As I had not had a failure in chronic constipation I persevered with the static wave current, and later with the static induced, but the constipation remained. I then discovered that the patient had a badly retroverted uterus, and that until that had been placed in a better position she would of necessity have trouble.

Two other cases illustrative of the necessity of seeing that the case is suitable occurred to me in the treatment of obesity by the Bergonié method.

In two cases I failed to get the reduction of the three pounds a week which I expect, but on careful inquiry in order to ascertain the cause of the unusual lack of response to the treatment, I found that one of the patients had reduced herself some 40 pounds before coming to me, and though somewhat overweight, was down to an irreducible minimum; the other case thought she was getting fat, and it was only when I found that the treatment was not reducing her weight that I carefully went into the matter of height and weight, and found that, in reality, she weighed less than normal.

Another cause of avoidable failure is persevering in the face of want of success. It may be that this may be criti-

cised, and the statement be countered with ancient saws such as "If at first you don't succeed, try, try again." It may be that such criticisms are justified, but my practice is as far as possible to discontinue treatment if no beneficial results are apparent from the first. Good results are obtained in nine out of ten cases. It may be said that this rule falls hardly upon the ten per cent. who are to be shut off from a possible benefit, but I think that in that ten per cent. the chance of benefit is remote, and that if electricity is going to do good, the good effects will early be manifest. There are few more discouraging things, both for the patient and physician, than to go on with daily electrical treatment with the symptoms showing no sign of abatement. It cannot add to the credit of electricity or to the reputation of the doctor, nor is it likely to alleviate the sufferings of the patient.

It may be that, as regards the ten per cent. that in the patients themselves there exist some unknown factors contradicting the treatment. What is the lesson in such cases? I think it is this: that there are, and must be, cases which will not respond to treatment, and an early recognition of this is not the failure that unsuccessful persistence becomes.

Another cause of failure is inattention to detail. This, of course, is true in other branches of medicine, but one is apt in the course of an extensive electro-therapeutic practice to overlook some small point whereby the success of the treatment is imperilled. When we find a patient not responding as readily as we expect, every trifle must be examined, whether in the apparatus, the method of using it, or in the patient's condition and daily life. "He who fails in one particular fails in the whole action." "Qui cadit a syllaba cadit a tota causa" is a legal axiom, held now, I believe, to be erroneous, in law, and it may be erroneous in the practice of electro-therapeutics; for it is possible to get results, and good results, with inferior apparatus, an inadequate knowledge of how to use it, and a lack of medical knowledge of the patient's constitution and anatomy. But we shall not get the uniform effects if we fail in the one particular. From time to time failures will occur which can only be avoided by scrupulous attention to detail.

In some cases in which success has failed to crown my efforts, on looking back I have found that the cause has

been over-confidence. This has occurred when there has been a run of successful cases and everything has been going well for weeks perhaps at a time, or when, after an annual meeting, or reading an optimistic article in the JOURNAL, a case has been undertaken, and the patient assured that there is every reason to expect success—and disappointing results follow. Yet, the converse, lack of confidence, is even more disastrous: "All fails where faith fails." "Alles waket wo der Glaube fehlet." I will admit it is difficult to strike a happy mean between these two, but it must be done in order to be successful, and proficiency in the employment of electro-therapeutics depends upon it to a great extent.

One cause of failure which I have found to be very common is what I shall call, for lack of a better phrase, patients "presuming on the treatment"—and this they often do in all innocence; but it is a danger against which they should be warned. Several classes of cases occur to me: one is the neurasthenic with a low blood pressure who comes complaining of want of energy, and of always feeling tired. He or she begins to improve say under the static brush discharge applied to the spine; a certain amount of energy is developed, and the patient joyfully begins to do more, and soon does too much, using up the energy produced by the electricity instead of storing it up toward the restoration of health.

So, too, is it with sciatica and other forms of neuritis; the patient, finding relief from pain, will presume on the treatment by giving the affected part too much exercise, and so returns little, if at all benefited, whereas if he had reasonably rested the limb, a second exhibition of electricity would have begun where the first had left off, and so on until a complete restoration to health had been effected.

Yet another case is that of the dyspeptic who, at the first sign of improvement, thinks he is altogether cured, and straightway goes and gives himself enough cause for more indigestion. All these patients should be told to do no more in the way of fatigue, exercise, eating, or what not, than they were doing prior to commencing electrical treatment, at any rate at first, or until permission is given them.

Allied to this class is another in which I have met with, and retrospectively can say deserved, ineffectual conclusions. This class comprises patients living at a distance. Here the

fatiguing effort involved in the journey neutralizes the benefit of the treatment. It is very difficult to know where to draw the line; in fact, it is impossible to say how much fatigue balances how much therapeutic effect. Each case must rest on its merits. It may sometimes be necessary for the patient to come once or twice, so that it may be seen which swings the needle farthest from the center, the positive good of the treatment or the negative harm of the fatigue entailed in reaching it.

Failures have occurred, and doubtless will occur again, so long as infallibility remains unconferred upon us, from a mistaken diagnosis. Two cases have happened quite recently in my practice: one was a shoulder, and one a knee joint—both referred to me as rheumatic joints. In each case the appropriate treatment for such cases failed to relieve the symptoms, and on taking a radiogram the origin of the trouble was in one case a small chip of bone due to an injury thirty years ago, and the other a small exostosis. The lesson to be learned is clear: it is to have a careful x-ray examination made of all obstinate cases, and most of those cases in which the diagnosis is not absolutely certain and clear. It is more satisfactory to the patient, and certainly a more scientific procedure for the practitioner.

I now come to a class of case—happily rare—in which our labors are in vain. This is when patients have an idiosyncrasy with regard to electricity. They fall into two divisions: those who suffer from electrophobia, and to whom electricity and everything connected with it is *anathema maranatha*, and the other, who has a true idiosyncrasy. For a long time I denied the existence of the latter, but several cases compel me to acknowledge its existence. Two cases will illustrate my meaning: one was a case of neurasthenia with symptoms typical if complex. The patient was most anxious to get well, and persevered with the treatment, and there was just enough improvement to justify its continuance. However, after several weeks' faithful attendance, we had to admit that a cure was not in sight. This patient afterwards told me that electricity never had suited him, although he had tried it previously in many forms, but that he had concealed the fact lest it might lead me to decline to undertake the case. Another instance was that of a lady who was

very anxious to be relieved of some superfluous weight. She was a subject apparently in every way suitable, but after a month's treatment she weighed but $7\frac{1}{2}$ pounds less than at the beginning. She then told me that electricity had never had good results, not only with her, but it had never done good to any of her sisters, who had had it administered for various ailments; and as long as it is admitted that certain people have an idiosyncrasy where drugs are concerned—witness the familiar examples of quinine, opium, the iodides, etc.—it is only reasonable to suppose that there are here and there those who have an idiosyncrasy in the matter of electricity. Fortunately, however, they appear to be rare. Rarer still are the patients with electrophobia, and this is hardly to be counted as a cause of failure since they do not often come under our care. However, it is a state which should be borne in mind, since a patient suffering from it may be over-persuaded by another, possibly grateful patient, or a parent who has benefited by electrical treatment may coerce a child, or a husband a wife, to try and reap benefit: but if the unreasoning fear is there, it will more than counter-balance the good that the treatment will do them.

I hope that this article is not too pessimistic; it is not so intended. It is written that others may avoid some of the pitfalls into which I have fallen, and that success rather than failure may occur in even a higher percentage of cases than before.

8 West Chappel St., Mayfair, W.

August, 1912.

Discussion.

Dr. J. C. Walton, of Richmond: I think that is one of the best papers I have heard anywhere. If I could have heard a paper like that at the beginning of my work in electro-therapeutics it would have been a vast deal of help to me. I have learned a great many things Dr. Humphris has told us by experience. I want to thank Dr. Humphris for this paper, and only regret that I could not have heard it ten years ago.

Dr. Jefferson D. Gibson, of Denver: There is one very important point that the doctor has brought out in his paper, and that is idiosyncrasy. Sometimes there is more back of idiosyncrasy than mere individual peculiarity. There are cer-

tain complications of disease in which you cannot use electricity. Especially is this so with galvanism and faradism. Apostoli's rules for electricity in gynecological cases were:

"If you have a fibroma in which there is any fatty or cancerous degeneration taking place, electricity is contraindicated. If you have an ovarian cyst you cannot use galvanism; it will have a bad effect. If you have pus you will find that galvanism will be contraindicated, and more or less all electro-therapeutic measures." I remember a case in which it seemed to be perfectly plain that electricity was indicated, a case of some pelvic trouble; but she would simply go wild every time I would use electricity. I thought it was an individual peculiarity. But some two or three years after that she had an ectopic pregnancy. I thought she would not stand electricity, so I had to have her operated on. I found that she could not stand electricity because she had an ovarian cyst, and that cyst was really the reason why electricity could not be borne.

Another thing that Dr. Humphris called attention to in the paper, is the tendency of patients as they get better to try to do more work instead of taking care of themselves. You must rest after the treatment. Apostoli put more stress on that than anything else.

Dr. Henry W. Frauenthal, of New York: I want to accentuate one point Dr. Humphris made, that is, the taking of x-rays in cases where you have joint pains and not treating the condition blindly as rheumatism or similar conditions. I have seen a great many cases who had had a great deal of local electrical treatment with the idea of curing something, in which the x-ray has proved either the presence of an exostosis, a detached piece of cartilage, or some other bone injury around the joint.

Dr. Francis B. Bishop, of Washington: I simply want to add to the discussion of this paper because Dr. Humphris has voiced the experience of every individual member of this society. We have all had our failures. A great many of our failures are due to our own carelessness, and a great many failures are inevitable from the patients taking exercise after they begin to get benefits, and so on.

One point on which I wish to insist particularly is the idiosyncrasy of certain individuals. I think I called the attention

of this society several years ago in Boston to two sisters that came to me for treatment. One of them was negative, and the other absolutely positive. They were such character of cases that I felt they should get the absolute tonic effects of the current. When one patient was on the platform receiving a positive charge the other patient in the same room with her sister was, of course, getting a negative charge, and that woman would become so nervous that she would have to go out of the room. But when she was placed on the platform and given a positive charge it had a decided sedative effect immediately.

Another reason for failures in some of these cases is that we carry our treatments too far—too strong treatments—and we get a stimulating effect instead of a tonic effect. Some of the neurasthenic cases you will find absolutely positive, others negative. A negative condition is always irritability. A positive condition is always sedative. When you get hold of a nervous person that person requires mild positive treatment. On the other hand, those people who are phlegmatic as a rule need negative treatment. It does not always follow, but we have found that out by experiment more or less. My experience has been that we have to treat those patients in the beginning very moderately, and find out what they will stand. In those nervous cases I contend that electricity suits every case if we know how much to give, and what modality to use.

Dr. William Benham Snow, of New York: A man that can report ninety per cent. of good results is not much of a pessimist. His apology was quite unnecessary.

I think idiosyncrasy is of very rare occurrence, and should not be emphasized too much in the minds of any of us. It may be a different modality will give the desired result. In the case of a cystic ovary I would not expect to have any trouble. I employed the direct d'Arsonval current. Those questions will depend upon whether we are using the right current and have made a correct diagnosis. A correct diagnosis will oftentimes lead us away from the question of idiosyncrasy to the adoption of the indicated modality. I think we should be grateful to Dr. Humphris for presenting a paper of that sort, because we all learn from our failures.

The point made by Dr. Humphris and emphasized by Dr. Frauenthal is an excellent one—that we should know what we are dealing with from the outset, because these are the things that make for success in every branch of therapeutics.

MEASUREMENT OF ROENTGEN RAY POWER IN
TOUSEY POWER PRODUCING A PHOTO-
GRAPHIC EFFECT UPON KODAK FILM EQUAL
TO ONE CANDLE POWER OF INCANDESCENT
ELECTRIC LIGHT.*

BY SINCLAIR TOUSEY, A.M., M.D., NEW YORK.

About a year ago a manufacturer of x-ray apparatus called me up on the telephone and said that a customer of his wanted advice and assistance. The physician, who had been using the x-ray with uniform success for seven years, had made a radiograph of a large man's hip, twelve inches in thickness; the wall of the tube was four inches from the skin; thirty-five amperes of primary current was used and the exposure was four minutes. No picture being secured another similar exposure was made two days later and without success. Some time thereafter a severe burn developed which had to be cut out like a cancer. Legal complications ensued and I could only advise the doctor to prove by hundreds of patients and scores of physicians that he was experienced and careful and to say for himself that he had done the best he knew how in this case.

The occurrence of such accidents seems to me to be due to the fact that there has heretofore been no accurate and easily applied means of measuring the strength of the x-ray applied in radiography and so of determining beforehand the limit of safety. It has long been known but cannot be too carefully borne in mind that the safe time of exposure is only one-quarter as long at a given distance from the anti-cathode to the skin as it would be at twice that distance. For difficult pictures through a great thickness of tissue and requiring an unusually long exposure we have always placed the x-ray tube at a correspondingly greater distance from the skin.

A means of exact measurement of the radiance given out by an x-ray tube is original with the author, and consists in measuring the photographic effect in terms of the photographic effect of 1 candle power of incandescent electric light. Various films and plates have different ratios of sensitiveness to electric light and to the x-ray. The kodak film has been

*Read on September 4, 1912, before the fourteenth annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

adopted as the standard. A portion of this is exposed to the equivalent of $1/10$ candle power meter second of incandescent electric light (in my own home 5 seconds' exposure to 4 candle power at a distance of 14 meters) and other portions of the same piece of kodak film are exposed to the x-ray at a distance of 1 meter for 1, 3, 6 and 10 seconds (equal to 1, 3, 6 and 10 meter seconds of the x-ray). The entire film is very fully developed and some part exposed to the x-ray may have opacity equal to that of the portion exposed to electric light. If 10 meter seconds of the x-ray equal $1/10$ candle power meter second of incandescent electric light the x-ray has only $1/100$ relative candle power and is said to have a strength of $1/100$ Tousey. No portion of the first film exposed may exactly equal $1/10$ meter candle power second and then another film must be exposed for different lengths of time, guided by the first experiment. Measured by myself, the x-radiance which I habitually use in treatment has a strength of $1/125$ Tousey and an exposure of 30 minutes at a distance of 13 inches or $1/3$ meter equals $5\frac{1}{2}$ H or an erythema dose. An arithmetical calculation shows that this erythema dose equals 130 Tousey meter seconds. ($1/125$

Tousey for 25 minutes equals 1 Tousey for $\frac{30}{125}$ minutes

or $14\frac{1}{2}$ seconds; and $14\frac{1}{2}$ seconds at $1/3$ meter equal $9 \times 14\frac{1}{2}$ seconds or 130 seconds at 1 meter.)

Greater strengths of x-ray radiance will produce the erythema dose of 130 Tousey meter seconds in a time which may be calculated from the Tousey power of the x-ray and the distance from the anticathode to the skin.

Tables have been prepared* showing the length of time required to produce an erythema dose with the strength of x-ray commonly produced by the static machine, the coil and the transformer, and at a variety of different distances. But in every case the operator should test his own apparatus.

The application of this method of measurement requires some little practice before the results may be relied upon. The exposure of a portion of the film to the equivalent of $1/10$ candle power meter second of electric light requires the utmost care. It must be done in a dark room and the electric light should be of the usual quality; a bright four candle power lamp for instance; but certainly not a dull red, one candle power lamp produced by turning down the current in an adjustable 16 candle power lamp. All parts of the film should be developed at the same time, in the same solutions, with a minimum exposure to ruby light in the dark room, and the development should be very complete.

850 Seventh Avenue.

* Tousey. *Quarterly Journal of Roentgenology*. Report of annual meeting of the American Roentgen Ray Society, 1912.

REPORT OF COMMITTEE ON PHOTO-THERAPY.*

EDWARD C. TITUS, M.D., CHAIRMAN.

The Committee on Photo-theraphy present the following as their report for 1912:

The first part is a continuation of the observations offered last year upon the physio-chemical effects of the ultra violet and blue violet rays upon both normal and abnormal conditions of the skin.

The second is the abstract of an article upon the beneficial effects of strong, clear sunlight in the treatment of bone tuberculosis, and

Third, investigations made during the past year by a Dr. T. T. Gaunt of New York, and the writer, upon the anesthetic action of true blue-light, the method of employment, apparatus, and therapeutic applications.

First part.—Physiological and therapeutic studies on the action of light upon the skin by the Director in x-ray laboratory of Dermatological clinic of Prof. E. Finger of Vienna. Studies of effects of light on a case of severe hydroa aestivale in boy of fifteen years who since earliest childhood, developed, during spring and summer, upon uncovered parts of body, i. e., nape of neck, cheeks and hands, large flat bullæ upon an intensely reddened base which dried up into brown crusts leaving depressed atrophied scars as in variola or severe acne. Similar conditions have been known to follow the effects of sunlight, and these effects are attributed to the short-wave or so-called chemical rays—blue-violet and ultra-violet.

In his experiments, Prof. Finger used the absorption instead of the dispersion filter. To determine the biological effects upon the skin, it was necessary to use light of same intensities. To determine the total amount of undecomposed light, as well as the energy of rays passing through different filters, he used the thermopile and galvanometer. He also found that a salve of Aesculin spread upon glass will permit 70 per cent. of light energy to pass through. The action of light can be differentiated into two types of physiological effects upon the skin:

I. Heat erythema which appears immediately or after the exposure and disappearing within a few hours without a trace.

* Read at the Twenty-second Annual meeting of the American Electro-Therapeutic Association, at Richmond, Va., September 3, 1912.

II. The photochemical erythema occurring after a variable latent period, which, if sufficiently intense, will produce blebs, crusts, scars and pigmentation.

The degree of heat erythema was determined by its duration. The degree of photochemical erythema, produced by the short-wave rays, was judged according to set scale.

First degree: slight pigmentation of three to five days' duration following a very slight erythema.

Second degree: a distinct erythema followed by marked pigmentation persisting for weeks.

Third degree: marked erythema, then bullæ, drying into crusts which after their detachment left behind scars.

In his case, the unmixed light of the arc lamp passed through a flask filled with water and focussed to point of burning, produced the third degree result in fifteen minutes, while in a normal boy of the same age only a marked erythema resulted, passing away in a few days.

Exposure of red rays for twenty-nine and a half minutes gave an immediate erythema persisting for ten hours, disappearing without traces after twenty-four hours. Orange-red and yellow gave the same result.

Exposure through green filter (yellow, green and blue) produced immediately after slight heat erythema which was completely gone after an hour; slight pigmentation after twenty-four hours, which was visible for three weeks.

Light filtered through the blue uviol glass for twenty-nine and two-tenth minutes caused photochemical reaction of the third degree after latent period of twenty-four hours.

It may be concluded from these experiments that the long-waved red, orange and yellow, and to a less extent the green, and least of all the blue, caused a transient heat erythema. On the other hand the short-wave rays passing through the blue filter and the blue uviol glass may produce photochemical erythema and hydroa.

By combining pale yellow flint with blue uviol glass Prof. Finger obtained a small zone of light,—blue-violet and slight degree of ultra-violet,—37 per cent. of 100.

If the skin of the patient was exposed for 40 3-10 minutes to these filtered rays it remained absolutely unaltered. This showed exactly that for the production of hydro æstivale and photochemical erythema, only the short-waved ultra-

violet rays are responsible. His previous investigations have shown that the ultra-violet rays within a certain zone are completely absorbed by the epidermis.

Magmes Möeller has shown that the rays of arc lamp filtered through an acid sulphate solution produced no hydroa æstivale, from which he concluded that the cutaneous changes in the hydroa are chiefly due to the ultra-violet rays.

Experiments have shown that pigmentation of the skin is due to ultra-violet rays only. Concentrated rays from a 7,000 C.P. arc lamp filtered through blue uviol glass directed upon the cheek of a boy, on the inner side of whose cheek was placed a capsule containing sensitized paper (sensitive to ultra-violet) exposed twenty-nine minutes, or as long as subject could stand, until the formation of bleb, when the blackening of paper showed that the light had penetrated through 3 m.m. of muscular cutaneous layer. The same result was obtained through 5 m.m. cheek of adult, but the rays would not pass through 15 m.m. of interdigital fold of boy, nor through the 24 m.m. of forearm of a little girl. Penetration of long-waved rays, red, orange and yellow, for one-half hour exposure, result was, that the red-yellow did not pass beyond 15 m.m. of cutaneous fat and skin layer sufficient to be detected by sensitive paper.

With more powerful sources of light and longer exposures and more sensitive test papers greater degrees of penetration may be determined.

Pathological processes, as tuberculous tissues, are not more sensitive than normal to light. Tuberculous tissues are no more sensitive to light than normal, as shown in lupus-affected persons who can remain all summer in most intense sunlight. Finger claims that it is not more light but concentrated light which is effective in the treatment of lupus.

The sensitized paper employed is a chlorine bromine silver paper.

From a therapeutic standpoint the assumption cannot be entirely rejected that long-waved heat rays—red, orange and yellow—may perhaps play an important part in photo-therapy, as, for instance, in bone tuberculosis. In this respect they, however, approximate the warming effects as in Bier's hot-air treatment.

From determination of the different effective zones in

spectrum, practical conclusions may be drawn: first, choice in carbons for photochemical erythema effect.

Further practical conclusions from his investigations: preparations which absorb the short-rays within the determined field of spectrum may act prophylactically in these affections which are produced by the action of such rays.

It has been determined that in the suppuration and scar formations of variola and xeroderma pigmentation the short-rays play an important photological part. In smallpox Finsen and his scholars have succeeded by shutting off the so-called chemical or short rays, in red or dark rooms, to mitigate the course of the disease.

Unna, Allan, Jamison and Pick have demonstrated empirically the etiologically important part of the short-rays in xeroderma, and Löw has determined this experimentally.

The 4 per cent. æsculin-glycerine salve referred to by the writer in a previous paper, as well as similar preparations, constitute means for absorbing the photochemical irritating rays for a certainty. Whether these preparations would serve to prevent xeroderma in predisposed persons or to prevent suppuration and scarring in variola can only be shown by trial.

If the author's deductions in regard to the action of the rays within the specified zone are true, then the 4 per cent. æsculin and similar preparations should prevent severe sequelæ in preference to confinement in dark or red rooms.

It was shown that parts of the body to which this ointment had been applied, in the case of the boy, remained unaffected when exposed to light for twenty-one minutes, while without such protection the typical hydroa eruption was produced.

Second part.—Some advance seems to have been made in the therapeutic uses of sunlight in Prof. Rollier's clinic at Leysin, more especially in the treatment of surgical tuberculosis. The diseased area is exposed to the direct sunlight. When bandages are needed, these are made with wide spaces. The patient's head is properly protected. The exposures are very short—only a few minutes at the beginning of the treatment, increasing day by day up to six, seven and eight hours in the twenty-four. Under the effects of the sunlight the local ulcers take on a more healthy appearance; any discharge from a fistula improves in character, pain is diminished, appe-

tite is increased and the patient begins to increase in weight, and the final effect on the joint is said to be beneficial inasmuch as motility occurs with greater frequency. It must, however, be pointed out that other factors may contribute to this happy result. The patient is at rest, in a dry, sunny climate, and lives almost literally in the open air: not that one wishes to underestimate the bacterial effect of heliotherapy or the hyperemia produced by it, both of which must be powerful agents in the cure of surgical tuberculosis.

The theory of the curative power of sunlight, or indeed what we are more familiar with, namely, concentrated artificial light, is not thoroughly understood. Some effects are obvious, such as the dilation of the cutaneous vessels, and the stimulation of the sweat glands. The deeper action may be due partly to this superficial hyperemia (for with the filling of the capillaries a depletion of the deeper vessels must follow), and partly due to the resistance to the light energy. It is a well-known fact that wherever energy meets resistance heat is generated at that point. Witness the familiar example of boring a gimlet into a piece of wood. Now, the skin is a poor conductor of heat, but it readily transmits light. This light, in the deeper tissues, meets resistance, otherwise it would be transmitted through the whole body: and it is, I think, that at the various points of absorption that the energy of the light rays is converted into heat energy. And it is the heat in the deeper structures producing a hyperemia to which the beneficial effects of the light is due.

Third part.—More than thirty years ago there prevailed what was afterwards termed the blue-glass craze. All sorts of ailments were thought to be amenable to the action of blue light, and the newspapers were filled with glowing accounts of cures. Enthusiasm ran for a time and then the matter dropped out of sight. Quite some time later there was a revival of interest in photo-therapy when Finsen demonstrated the curative properties of the ultra-violet ray in various affections, especially lupus. Since then the physiological action of light has been carefully investigated and although much remains to be learned there can be no doubt that we are nearer to an appreciation of its possibilities in the treatment of disease. One of the most remarkable actions of light which has been demonstrated beyond all peradventure is that blue light possesses remarkable anesthetic power. In

experiments there was used a series of slender glass rods about one-eighth of an inch in thickness, placed side by side, and tied together so as to form a kind of flexible mat which will adapt itself to various parts of the body. The glass must be of cobalt blue and transmit no red rays, this being a very important point. The rods are to be placed upon the area to be anesthetized, and some form of white light, preferably a Tungsten lamp, brought as closely as possible without causing discomfort. Strange to relate, in twenty minutes, the part becomes insensitive so that superficial and even deep incisions or punctures are no longer felt. This anesthesia lasts for one-half hour or more, and has occurred so constantly that there is no reason to believe that it is the result of suggestion or accident. Many surgical operations may be performed under this method and without the least pain or discomfort, in some cases where colonic flushings are attended with severe pain and faintness, if the abdomen be covered with a large sheet of pure cobalt blue glass and the parts exposed to the rays from a 500 c.p. Tungsten lamp for thirty minutes, the operation can be carried on without the usual inconvenience noted. It is very necessary that the glass be in absolute contact with the skin, as the wave lengths of the blue rays are so short that anesthesia is not produced if this detail is omitted. The same procedure can be employed for relief of myalgias, neuritis and many forms of local painful conditions. The irritation and itching of ivy poison and the stinging in neuralgic symptoms of shingles or herpes zoster can be relieved by a thorough application of blue light as above described.

Another beneficial effect of blue light may be mentioned; that upon the mucous membranes. Acute as well as chronic catarrhal affections yield to these methods, as is strikingly shown in the prompt relief given to sufferers from hay fever—20 minutes' application of blue light from a 50 c.p. lamp set in a suitable reflector, will give greater and more lasting beneficial effects than any other known remedial agent.

Committee: H. F. PITCHER,
W. B. SNOW,
F. H. HUMPHRIS,
E. C. TITUS, *Chairman*.

Discussion.

Dr. William Benham Snow, of New York: Dr. Titus has brought out some points in his report that are essentially new.

I feel, however, that the report from the German authority is made by one who has not surveyed the whole field of radiant light therapy. He has looked at it from the point of view of the action of the ultra-violet rays rather than to have recognized the thermic and luminous effects of the other rays as inhibiting germ life and producing local hyperemia. Personally, I believe that the ultra-violet rays are of comparatively little value as therapeutic agents, because their effects are superficial, but the thermic effects of the other frequencies, particularly of the infra-red, are remarkably effective in producing hyperemia, thereby enhancing local phagocytosis, improving nutrition and increasing metabolism by the transformation of radiant energy into heat units and the depressing effects of the luminous rays upon the germs when present.

As for the present use of the blue-rays for the production of anesthesia, I have often tried to accomplish this and failed, and I shall have to try again. Dr. Titus' sanguine expressions must be the result of experience and the results obtained by him seem to justify his contention.

As for the use of the apparatus which he described for hay fever, the question arises, is it curative or palliative? My own experience in the treatment of several cases of hay fever, by the method described by Dr. Tice two years ago, is that most of them seem to have been cured. Is the method described by Dr. Titus a better method? is the question.

As for the contention as to the penetration of the ultra-violet rays, I still believe that Finsen's classic experiments were conclusive. In the view reported it was observed that the ultra-violet rays seemed to pass three to five millimeters into the tissues when projected from a 7,000 c.p. arc lamp. Such lamps are not practical for therapeutics, but the results of an experiment with a lamp of great power.

There is no more interesting subject in physical therapeutics than light-therapy. We are indebted to Dr. Titus for these suggestions.

Dr. Henry E. Waite, of New York: I do not wish to discuss the report but the way it was delivered. Dr. Titus gave us a straight story. He told us what he had done and his results. You have all got a chance to try it out. There are no ifs and ands about it. That is what we all should have in all our papers. We want the facts, and if we get those we may find the theory later.

Dr. Titus: Blue light produces a decided anemia on mucous surfaces. We know that if we expose an open ulcer to the rays of white light there is a hyperemia produced. If we expose it to the action of blue light we get an anemia. The anemic effect of blue rays on mucous surfaces is very pronounced, and I attribute the results in hay fever to that effect.

On motion the report was accepted and placed on file.

REPORT OF COMMITTEE ON STATIC CURRENTS
AND APPARATUS.*

HERBERT F. PITCHER, M.D., CHAIRMAN.

Owing to the voluminous report made at the last annual meeting, the Committee on Static Currents and Apparatus have very little that is new to add to that report.

Your Chairman has corresponded with most of the prominent manufacturers of static machines and accessories, and they have nothing new to offer for this year

Dr. Edward C. Titus, of New York City, has made an innovation in the technic of the wave current which is worthy of note. He employs pure silver electrodes in place of soft composition metal, in all of his wave current applications. Silver being a much finer metal and a better conductor seems to increase the efficiency of the effects. He thinks it may be possible that there is a specific action from the metal itself, an *ionizing* effect. So impressed is he with the difference and the clinical results, that he now uses the pure silver metal electrodes to the exclusion of all other metals.

Dr. Howard Humphris adds the following observations on a new *desiccating apparatus*.

With a view to an improvement on the already-mentioned drying methods and consequent efficiency of the machine, I am having made an apparatus which is designed to fill the interior of the case with desiccated air.

The amount of moisture in a certain volume of air depends upon the temperature of the air and pressure to which it is compressed. This apparatus consists of a power-operated air-pump suitably designed for pumping air through specially prepared desiccating apparatus, consisting of one or more cylinders filled with calcium chloride.

The air passes through the desiccating cylinders in question in series, and in such a way that the calcium chloride may extract as much of the moisture as possible from the air on its passage through. This air, under slight pressure, and after being freed from moisture, passes into the lower end of one side of the machine; the upper and opposite end is provided with an escape valve.

* Read at the Twenty-second Annual meeting of the American Electro-Therapeutic Association, at Richmond, Va., September 3, 1912.

The operation of passing the air through is continued until the necessary degree of dryness has been reached: the volume of air pumped in and the pressure at which this air is delivered depend upon the results obtained. Whether it will be necessary to lower the temperature of the cylinder by means of CO₂ or some similar means, and how often the apparatus will have to be used to change the air in the static machine, can only be determined after it has been running for some time.

Dr. Snow added the following description of a method of employing static electricity in the treatment of obesity and other conditions, in which it is desirable to effect the establishment of increased muscular tone by exercise as in poliomyelitis. The treatment also arouses the emunctories to greater activity by stimulating local and general metabolism.

The static induced current is the current employed. A large, soft metal electrode, 14 by 24 inches in size, is applied to the back from the neck to the ilei, posteriorly, and connected by a wire to one of the binding posts of the machine provided for administering the static induced current. Smaller electrodes, of the same material, are placed and secured by bandages to the abdomen and muscles of the limbs and shoulders, each of which is connected by a wire to a common wire, which is attached to the other binding post of the machine. The Leyden jars may be of the same size, or different sizes may be employed, regulated to the effects produced. If when the current is administered, a marked degree of discomfort is experienced on either side a smaller Leyden jar may be attached to that side.

The spark-gap should be regulated to produce positive but not painful contractions of the muscles, and the speed of the machine be regulated to produce a rate of discharge approximating 120 per minute.

If this method is employed in persons whose emunctories are inactive for want of exercise from sedentary habits, the treatments should not, at first, exceed ten minutes daily lest the system may be overwhelmed with the toxic materials which are not eliminated. The time can be increased five minutes each week until they are given for one-half hour daily.

. On motion the report was accepted and placed on file.

PHYSICO-THERAPY OF TUBERCULOSIS.

Communication Made to the Second Spanish International Congress on Tuberculosis, at Saint Sebastian,

September 9-16, 1912.

BY DR. J. A. RIVIERE, OF PARIS.

In my communication entitled, *Treatment of the Malignant Tumors and Tuberculosis by the Effluations and Sparks of High Frequency* (First International Congress on Medical Electrology and Radiology, Paris, July, 1900), I was the first to insist on the excellent effects of alto-frequent effluvation in the treatment of local tuberculoses, and tuberculosis of the bones in particular. In a communication entitled, *Treatment of Tuberculosis by High Frequency Currents* (British Congress on Tuberculosis, London, 1902), I spoke, after Doumer, on pulmonary tuberculosis, and again insisted on localized tuberculoses. I reverted to the same subject in *Considerations on the True Etiology of Tuberculosis and its Physico-Therapeutic Treatment* (American Congress on Tuberculosis, Atlanta, Georgia, April, 1905), and in *Tuberculosis Considered as an Endogenous Malady* (Congress of the American Anti-Tuberculosis League, Atlantic City, U. S. A., June, 1907).

I have no intention to-day of speaking about the etiology of tuberculosis.

Clinically speaking, I will only say that I believe much less in contagion than in the great nocuity of intoxications in general and of auto-intoxication in particular.

As we said in our communication on "Atmo-therapy" (First French Congress on Climato-therapy and Urban Hygiene, Nice, April, 1904), and in "Ozono-therapy" (Second French Congress on Climato-therapy, April, 1905), the air expired and taken in again by the lungs is, for the most part, the origin of cases of pulmonary tuberculosis. On the other hand, the abuse of meat food, by poisoning the nutrition at its most active sources, creates a predisposition to tuberculosis. Phthisis is the last result of a multiple intoxication due to virulent organic waste products of the cells; the digestive tube has as great a share as the ærial tree in

the spontaneous generation of Koch's bacilli. It is well known that the fatty acids introduced into the blood by alimentary fermentation can produce the gravest anatomico-pathological lesions in the pulmonary tissue. It is known also that dyspepsia, due to drugs or otherwise, and gastro-enteritis, alcoholism, etc., come in as singular complications to tuberculosis of the lungs. Finally, physico-therapy (air, repose, alimentation) has been for a number of years the rational treatment of "poitrinaires," often to the exclusion of all pharmaceutical remedies now recognized to be more harmful than useful, although prescribed in accordance with tradition.

Before entering on the details of the cure as we understand it, we should like to insist on the possibility of introducing a really profitable prophylaxis. This may be summed up in two phrases: watch the digestive tube; watch the respiration. The onset of tuberculosis is marked invariably by "malaise" (feeling unwell), fatigue, loss of flesh, with headache, insomnia, anorexia, loss of strength. Even before any stethoscopic signs on the part of the lungs, it is noticed that the liver and spleen have increased in size, and that there is a little rise of temperature, etc. The point is, at this period, to free the organism from the toxins which are besieging it, in order to avoid bacillary eclosion.

A reasonable use of calomel, castor oil, diuretics and diaphoretics (warm drinks, frictions), methodical ventilation of the lungs by pure air and ozone, suppression of intoxication by meat foods: such is the method to pursue in order to free the economy from its toxic débris and forestall microbic generation. The supreme preventive medium rests in a good hygiene of the ærial tree and the digestive tube. *Tuberculosis is impossible in a subject who breathes healthy air, and whose stomach, intestines and hepato-renal discharges act in a satisfactory manner.* On the other hand, permanent æration and atmo-therapy, while enriching the blood and fortifying the nervous system, purges both the humours and tissues, establishes perfect cellular exercise, and favors organic renovation while guaranteeing the assimilation of a simple food régime (with very little meat and rather sparing), without overloading of waste products. When once the molecular interchanges of our inmost metabolism are perfectly assured, the invading microbes are forced to beat a

retreat in the presence of intensive vitalization, which is inimical to all functional decay. Everything which combines to combat auto-intoxication, and to tone up nutrition effectively, to stimulate assimilation, to act on the trophic nervous system, will also combine in the cure of the tuberculous.

Under these conditions we can gauge the role which has devolved on physico-therapy in the rational treatment of tuberculosis. In fact, all the various applications concerned in this method (comprising electricity, hydro-therapy, photo-therapy, thermo-therapy, mechano-therapy, various gymnastic exercises, atmo-therapy, etc.) combine in the symptomatic cure of the malady, and assist the retention of a reserve value in the various functions of molecular vitality, as well as in the reparation of perverted trophic functions. The richness of the natural resources which we draw attention to allows us to adopt the potential of treatment to all forms and phases of tuberculosis: for the physico-therapeutic agents must be administered and formulated in "doses" like medicines adapted to various morbid conditions and even to personal idiosyncrasies. Without a complete and perfect equipment, the practitioner cannot hope to obtain a scale of cures graduated with sufficient delicacy to hope for useful dynamic reactions. Air, water, heat, electricity, have thousands of methods of application, according to whether we need congestion or decongestion, to reduce swelling or provoke stases (Bier's method), to stimulate or soothe the muscular fibers, eliminate scorix and morbid secretions, cleanse or feed alveolar hæmatosis, facilitate absorption and remove the barriers set up by auto-intoxication. To make use of a familiar figure of speech, we might say that our method of practice has for its final goal to prevent the *cohabitation of the dead with the living*, that is to say, to chase away anatomic elements which are cadaverous or bacteric, as well as toxins and leucomaines manufactured by the cells. It thus happens that, when nutritive osmosis has been increased, nervous energy accelerated and the hematic budget well balanced, reparation and recorporation are not slow to follow. The biochemical deviation, in fact, which constitutes tuberculosis is, therefore, amenable to physico-therapy.

It would need a volume to detail all the methodical applications. I will just limit myself here to bringing forward the

principal ones, those which are less disputed and most in vogue.

In electro-therapy the effluations and sparks of high frequency, when judiciously applied, enjoy universal repute for the cure of tuberculosis. I was the first to bring this action to light in a communication made on the 28th of July, 1900, to the International Congress on Electrology and Radiology, held in Paris from July to August, 1900.*

In this communication I attributed to high frequency *first*, a thermo-electro-chemical action, having for its effect the elimination of new formation of tissues, as well as micro-organisms.

Second. A curative tropho-neurotic action, restoring the vital processes to their integral condition, firstly by local phagocytosis, and next by amelioration of the patient's general condition. In 1902, at the British Congress on Tuberculosis, I returned at great length to this question, and supported my arguments with several observations, which will be found in my "Annals of Physico-therapy," as well as an important communication on the same subject at the Atlanta (Georgia) Congress.

In 1908-9, the paper published by M. Thielli in the *Annals of Electrobiological*, has enabled us to put our finger on the exact point when the bi-polar effluvation of high tension is capable of modifying the tuberculous soil, of arresting organic demineralization, and restoring to the hæmo-leucocyte formula its normal percentage. We may affirm, in fact, that no other method is more prompt to raise the respiratory coefficient, nor does any other develop with more certitude the ventilating capacity of the apices. Experiments made on guinea-pigs by Lagriffoul and Denoyes (1901) corroborate, moreover, the clinical observations which we have published.

Personally, I have always seen alto-frequent effluations and sparks act efficaciously against pain, cough, and expectoration (the 3 cardinal symptoms of phthisis); it also facilitates absorption of exudate and disappearance of dyspnoea, and wins back appetite and sleep. To sum up, the d'Arsonval currents

*In order to be just, I must recognize that, since 1898, Prof. Doumer showed, in a learned note published in the *Annals of Electrobiological* (November 15, 1898), the well-defined action of high frequency in augmenting the defensive reaction of the organism.

modify local and general combustion, increase vascular tension in the lungs, and endow the nutritive exchanges as well as cellular life with extraordinary activity. But local devulsion and circulatory drainage above all explain why this therapeutic method restrains exaggerated respiratory combustion; thins out cellular toxins, and increases the resistance of the organism to microbic proliferation. The heightening of the digestive and nutritive forces, the awakening of aptitude for work, regularization of diuresis and other enunctoria (suppression of night sweats), seem to be rather the direct consequences of the reconstitution of blood impoverished in oxyhæmoglobin by morbid function.

Hæmoptysis and fever constitute for us a contra-indication for electric treatment, and we then advise calomel and castor oil so as to stimulate the elimination of toxin.

Yet, other electrical methods can be employed with success in tuberculous cases, baths and static douches to combat nervousness, insomnia, and, as sedative media for the general sensitive system. Continuous currents against neuralgias and intercostal neuritis, dyspnœa and asthenia, hydro-electric baths as a regulator for the circulation, and, as an antiphlogistic, Roentgen rays as bactericide and resolvent of lymphatic neo-formations (bronchial adenopathy). *Actino-therapy* renders good service especially in the case of torpid and sclerosing forms of pulmonary bacillus-formation, at a time when the process demands excitation in the case of subjects who are rendered insufficiently erethistic by general anemia and neurasthenia. Actino-therapy, being a dilator of the vessels, hyperemic and sedative at one and the same time, a repairer of globular damage and restorer of equilibrium to the nervous system, soothes oppression and tachycardia, regulates the temperature, encourages alimentation and digestion. Let us remember that tuberculosis is a disease of darkness, and that deprivation of light plays as great a part in its pathogeny as deprivation of air itself. The bacillus of Koch accomplishes its dire task in the shadows, and in an organism which is intact, very often with hereditary taint. In this way the curative value of actino-therapy is explained as well as that of helio-therapy, which is its most natural form. The radiating energy is absorbed by the protoplasm, which derives from it a kind of dynamic and

vitalizing charge (M. de Laroquette). Physiological opinion is divided on the subject of a direct bactericidal power, but one thing is certain, and that is, by the stimulation imparted to the means of defence, the therapeutic radiation produces incontestable bactericidal effects on the germs enclosed in the alveoli, which successfully resist all general and local treatment. Actino-therapy, therefore, is not to be despised, as we have shown by the phthisio-therapist. *Ozonized inhalations* increase the field of respiration and prolong expiration, a fact which augments the capacity for pulmonary ventilation. It is, in fact, vital air domesticated; the air which, by its oxidizing force and its power of penetration, is most capable of restoring to the pulmonary mucosa its physiological condition. Personally, I have succeeded in increasing the curative value of ozone, by joining to it the volatile, antiseptic or balsamic principles of creosote, eucalyptol, iodoform or menthol. I thus obtain a veritable gaseous dressing which is both bactericidal and soothing, ozone being the medium. It is chiefly in catarrhal forms and in fetid bronchitis which accompanies certain tuberculoses that we must have recourse to this excellent method for modifying alveolar epithelism, and diminishing the virulence of purulent expectoration. This medicated atmiastry has the double advantage of controlling the digestive passages and of possessing a direct deterrent action.

Mechano-therapy is also a powerful auxiliary. It is the only truly rational gymnastic method of expanding the thorax, fortifying and facilitating the *heart's* action; facilitating visceral secretions and promoting active assimilation. Combined with hydro-therapy and carbonic acid gas baths, it increases resistance and tones up the condition of the thorax in an astonishing manner. Is it not the aim of all respiratory gymnastics to clear out the alveoli, to facilitate local muscular development, to destroy pleural adhesions by mechanical movements applied to the chest? Under these conditions the poisoned air, hot-bed of impurity, no longer stagnates in the lungs, whose expansion is favored by such an overpowering influx of air that the bronchioli become permeated with it. One can scarcely imagine to what an extent local circulatory distress, or myasthenia, and the muscular atrophy of the intercostals contribute to make the phthisic

patient suffer and aggravate his condition! Mechano-therapy and Swedish gymnastics constitute the natural remedies for these frequent complications.

One word more, before concluding, on the treatment of local tuberculoses. Without under-estimating the action of x-rays, I think (and I was the first to publish the fact) that the main electro-therapeutic treatment rests with the effluvia and high frequency sparks, whether we are dealing with ganglionic, osteo-articular, visceral or testicular lesions, we shall always obtain anatomic cure by the transfixion of the effluvia and super-activity imparted to the cells. It is a kind of *intimate* massage, *histological* (Picard), which is furnished by the electro-thermo-chemical vibratory wave; its penetrating, but not too violent, power modifies the most impaired tissues. The adenopathic masses, especially, dissolve very rapidly by this method. In osteo-arthritis, especially with fistula, retrogression is slower, but cure follows, as a rule, even in serious cases given up by surgery. In tuberculous orchitis the increase in the local vitality of the tissues is no less manifest. Not only does the treatment exercise an elective action on the morbid tissues, but it puts an obstacle in the way of general infection; facilitates retrogressions and always gives very clean scars, while the lancet gives such ugly ones.

Lupus, that type of cutaneous tuberculosis, can to-day be radically cured in a few weeks by the methodical combination of photo-therapy, radio-therapy, high frequency and electro-puncture. Photo-therapy, as we have seen, is bactericidal by the chemical rays of the spectrum; radio-therapy is analgesic, and with a tendency to a sclerosal process; alto-frequency is decongestive by vaso-constriction, favors diapedesis, phagocytosis, and cicatrization. As to electrolysis, it is a galvano-caustic process often indispensable for accelerating the definitive modification of the pathological tissues, as well as the perfect inodular repair of the lipoma which have resisted other physico-therapeutic agents.

CONCLUSIONS.

(1) Clinical observations show us the endogenous origin of tuberculosis, the result of manifold intoxications, of which Koch's bacillus is only the result of the witness.

(2) Prophylaxis consists in due care being given to what

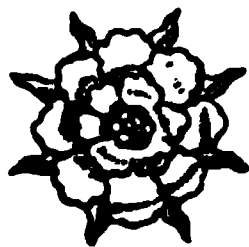
I have called the main sewer of the organism, and to the ærial tree; suppression of all superfluous meat food, which is only poisoning, according to the ideas which we were the first to put forward. The dangers of contagions are very limited. Combat auto-intoxication, eliminate waste matter, restore trophism and nervism, stimulate assimilation: this sums up the whole of rational phthisio-therapy.

(3) All the physical agents domesticated, formulated and dosed conveniently, are adapted to the cure of chest diseases; the sole condition being that we should possess an equipment complete and perfect enough to obtain all the gradations of the therapeutic scale.

(4) I was the first to show (1900) the heroic power of effluviations and sparks of high frequency in osseous tuberculosis. Our observations have been confirmed on all sides for the last 12 years. Other electric methods should not be neglected, but they have not, by any means, the specific curative value of high frequency.

(5) Actinc-therapy is excellent in torpid forms. Ozonized balsamo-antiseptic inhalations triumph over catarrhal and purulent complications. Mechano-therapy is an excellent method of respiratory re-education.

(6) The high frequency effluvia and sparks, moreover, give the best results in the treatment of local tuberculosis (adenopathiæ, osteo-arthritis, tuberculous orchitis, lupus, etc.). The curative penetrating power and elective action of detersion on morbid tissues are, in this case, superior to the Roentgen rays themselves, as we have shown in our works on the effect of high frequency scintillation in cancer.



Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

Epithelioma of the Tongue with no Recurrence Nine Years after Clinical Cure with the X-ray. Martin F. Engman, M.D. (*Jour. Ama.*, March 23, 1912.)

This case is of interest as it had every clinical symptom of epithelioma of the tongue and was so pronounced by several of the leading surgeons and dermatologists of St. Louis and Chicago. In May, 1902, the patient was observed with a hard nodule on the left side of the tongue occupying the anterior third. The nodule was raised about one-eighth of an inch above the surface of the tongue and extended into the surface some distance. It was hard, indurated and resistant. The nodule was already ulcerating, and there was some pain. It had existed several months, and was slowly increasing in size.

No specimen was taken for microscopic examination, on account of the danger of such a course. The patient refused operation because of the location of the lesion. Therefore it was decided to see what could be accomplished with the x-ray. The face and head were covered with a piece of lead for their protection, and a hole was cut in it a little bit larger than the growth, so when pulled out with the hand it was very accessible to the ray. The tube was placed at distances ranging from 5 to 2 inches from the nodule. Thirty exposures were given in all. The radiation was continued daily for ten or fifteen minutes, until the mucous membrane was whitened and a reaction was obtained. This was allowed to subside when another active course of radiation was begun. The last series of treatments were continued until a marked reaction ensued and all the mucous membrane was whitened. In two weeks after the last series the whole organ or tissues rayed became very much swollen and inflamed. This lasted for one week, when it began to disappear. Now a slough formed, including all the tissues exposed to the radiation, this, according to the patient, came away "*en mass*" as dead necrotic tissue, leaving a healthy granulating surface which healed in a few weeks. There was an elegant cicatrix formed on the tissues, soft and pliable, and to-day, nine years after the x-ray treatment, it is absolutely well, having given no trouble whatever. He states that he would not ordinarily treat cancers or epitheliomas of the tongue with the x-ray, but this

man would not submit to an operation and so the x-ray was a necessity. The editor of this department thinks the patient came off best one time at least, he has his whole tongue instead of a piece, and is alive and able to enjoy it. The doctor is to be congratulated on his success. It is another victory for the x-ray in malignant conditions.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D., LOUISVILLE, KY.

The Cold Water Treatment of "Nervous Dyspepsia." By A. E. Austin. (*Boston Medical and Surgical Journal*, May 16, 1912.)

It has always seemed strange to the editor of this department that we do not have more articles of this type, that is to say, the treatment of the so-called functional nervous disorders of the gastro-intestinal tracts, by means of hydrotherapeutic measures. In the treatment of any neurosis, the first and essentially necessary step is the diagnosis, for without this we cannot in truth state that we have to deal with a purely nervous manifestation, nor is it to be inferred that because hydriatics have been employed that they in any way interfere with the dietetic or medicinal treatment of such cases. The separation of the goats from the sheep in a differential diagnosis of these disturbances is not always an easy matter. The author of this article says that the particular form of the treatment must be selected according to the circumstances as well as the prejudice of the patient. From the reviewer's wide experience of twenty-two years in the practical daily handling of such cases, he is willing to concede the first statement as to circumstances, but he believes that prejudices can be readily overcome by a little tactful educational methods.

The simplest form is a cold sponge followed by a brisk rub in the morning upon rising, particularly applied to the abdomen. This can be assisted by the morning glass of cold water taken in sips, particularly if there is constipation. Still more practical is a couple of handfuls of water dashed over the abdomen and rubbed in, the same way as the face is washed. A couple of towels wrung out of cold water pinned about the abdomen for five minutes morning and evening also fills the demand, and the evening application, covered by a dry bath towel, may be worn all night during the sleep. The inexpensive bath-sprinklers sold at drugstores and department stores enable the patient to administer an excellent cold needle-spray or an alternating warm and cold spray.

It should be remembered in suggesting the cold plunge that of all the forms of hydrotherapy, it is probably the most

strenuous and as the writer suggests, should be limited to a momentary immersion of the body in cold water, followed by a brisk rub-down with bath-towel or, better, with elephant-ear mitts made of coarse toweling. Popular objections to the cold plunge are usually due to their faulty application, and if the plunge is momentaneous, no harm follows in most cases. The further part of the treatment is the morning glass of cold water, which, taken when the stomach is empty, has the power of stimulating the gastric juices and of diluting the overacid gastric secretion. Although the amount of gastric juice excited by the water is small and slowly produced, the insignificant amount excites appetite, which in turn arouses more gastric juice, and therefore the simple glass of cold water (not ice water), taken twenty minutes before the meal, will be sufficient to start a course of digestion.

It is the reviewer's opinion, based on long experience that the shower bath, warm at first, rapidly reduced to a colder temperature will prove very much more effective.

The author pays his regards to rectal injections or clyster, or the so-called internal bath, but objects to copious flushing of the bowels, while he insists that the injection of a pint, never more than a quart, of cold water into the rectum stimulates the secretion of both the intestinal gastric juices and that it also has a favorable effect upon the habit of constipation.

Cold water is undoubtedly one of the most useful therapeutic agents that we possess, and if employed correctly has great power for good. Its administration both by mouth and by rectum has been said to produce colicky pains, but the pain following the drinking of cold water is usually due to the fact that the glassful of water is gulped down instead of being sipped, and the colic after the cold clyster is due to the injection of air or to the attempt to inject too much. In the latter case, the patient should commence with injecting a cupful of cold water and should never increase the amount to more than a pint (C. P.)

Refrigeration Without Ice.

Perhaps there is nothing more important than the preservation of milk for infantile consumption during the heated term, when conditions are so favorable for fermentative processes and for the inception of inflammatory intestinal diseases and disorders, and for that reason medical men, when called upon for an economical method, should suggest to their poor clientele the following method, which has been taken from the *Fresh Air Magazine*, which says:

If there is no refrigerator in the home, and ice can not be

afforded, milk can be kept cool for twenty-four hours in a home-constructed "cooler," which will cost only twenty-five or thirty cents, and will last the entire season. To make such a cooler buy a butter tub with lid at the grocer's. It should cost ten cents. Purchase ten cents' worth of sawdust (or your butcher or grocer may be willing to give you the small amount required). Make a bag of denim or other material of a size that will fit the top of the tub closely, and fill this with sufficient sawdust to make a cushion about an inch thick. Sew up the open end of the pillow, so that no sawdust can leak out. Fill the tub with sawdust to within an inch of the top. As soon as the milk arrives in the morning, sink the bottle into the center of the sawdust, leaving some sawdust underneath, and the rim of the bottle above, so that it may be pulled forth easily. Place the sawdust cushion on top and shut the lid on tightly.

Sawdust is a non-conductor of heat, and will not allow the cold of the bottle to escape or the heat of the atmosphere to penetrate to it. However, whenever the milk is used, the bottle should be drawn forth, the amount desired poured out, and the bottle returned at once to the sawdust. Sawdust will not cool milk which has been allowed to get warm in the air.

When one or two cents' worth of ice can be afforded, a good little refrigerator can be constructed with the butter tub and a lard can. Place a thick layer of the sawdust on the bottom of the tub, then put in the lard can and pack sawdust all around it, as high up as the can lid. A little piece of ice, wrapped in newspaper and placed in the bottom of the can, will keep all day, if the can is covered with the sawdust cushion and the lid of the tub is kept tight. Butter and milk can be placed in the can with the ice, and kept good and cold.

The physician can also remember that where the household can purchase a moderate amount of ice each day, this can be readily preserved either in a tub as above mentioned, or by simply wrapping the piece of ice up tightly in a number of layers of newspaper, placing it in an ordinary tin foot tub, surrounded by milk and other food to be preserved. It is astonishing how this will "keep" the ice. To many these simple methods will oftentimes prove a god-send.

(C. P.)

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERICK DE KRAFT, M.D., NEW YORK.

High-Frequency Currents in General Practice. By L. A. Brown, M.D.

The writer lays special stress upon the effect of high-frequency currents in increasing the elimination of the waste

products of the body. "The organic changes which take place in the body can in a measure be gauged by the excrementitious waste thrown out of the system." He makes the broad statement, "It is commonly agreed that the high-frequency currents will materially lower blood pressure by relaxing or dilating the arterioles."

When we remember the principles involved, it becomes apparent that such a general statement is as incorrect as the other extreme assertion: "Static electricity raises blood pressure."

The fall in blood pressure is probably the result of (1) the general quieting effect of the current. A person on the auto-condensation couch experiences a delightful feeling of quiet restfulness resulting in a general relaxation of the voluntary muscles of the body. The mind, too, is influenced in a remarkable manner. There occurs a sort of dreamy state which is often followed by quiet, refreshing sleep. Part of this effect is the result of the peculiar noise of the apparatus, but by far the largest part of it is due to the extremely rapid oscillations of the current surging through every molecule of the body. The rythmical succession of impulses imparted to the molecules by the rapidly succeeding groups of oscillations tend to induce restfulness much in the same manner as the nurse employs when she rocks and sings the baby to sleep. It is said that many people when riding in high power motor cars over the smooth highways of Europe will fall sound asleep when a speed of sixty miles an hour is reached, and wake up the moment the speed is reduced. Here again the rapidly succeeding impulses imparted to the body by the swiftly moving car exert their influence.

The stimulation of the end organs of the sensory and motor nerves by the heating of the skin, the muscles and the blood stream, results in impulses being transmitted upward to the vasomotor and respiratory centers and to the great sympathetic nervous system. This results in stimulation of the sweat glands, increase in the depth of the respiratory excursions together with a general flushing of the peripheral blood vessels and relief of visceral congestion. The tendency to venous stasis around the great splanchnic circle in conditions of intestinal auto-toxemia is a decided causative factor in allowing irritating substances to circulate in the blood which in turn sets up an irritation of the involuntary muscular fibers of the blood vessels, resulting in spasm and increased tension. Here, then, we have a regulating effect.

Again the carbon circulating in the blood stream is utilized for maintaining bodily heat and producing muscular and nervous force by its combustion.

The heat imparted to the body by the oscillatory current helps not only to stimulate vital processes in conditions of

lowered functional activity, but spares the tissues some of the pabulum which would otherwise be burned up to produce heat and power. This may suffice in certain conditions of lowered metabolism to again swing the pendulum in the right direction by giving an exhausted or badly nourished organism a much needed support.

This can occur in certain conditions of lowered blood pressure as the result of broken compensation of a former high blood pressure in an increased arterial pressure with stronger and steadier pulse, and better, freer heart action. In conditions of lowered blood pressure following mental shock this introduction of heat from without frequently arouses the vital powers to renewed efforts and raises the pressure.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER M.D.

Electrolytic Epilation. (From the *American Journal of Dermatology.*)

For the removal of superfluous hair upon the face, Prof. W. Dubreuth, of Bordeaux (*La Presse Medicale*), maintains that electrolysis remains the method of choice. Its only inconvenience is in the length of time taken in the applications.

It demands great patience on the part of the operator and the patient alike, but these drawbacks are small compared with the perfect results obtained when the operation has been successfully performed. The skin should preserve its normal texture, without a trace of scarring or atrophy.

The principal thing to avoid is the use of too strong a current, for if the needle be properly placed in the follicle, a very little will suffice to destroy the papilla. The physician should avoid yielding to the entreaties of the patient to use a stronger current in the hope of saving time or of removing the hairs more effectively. Disaster will surely follow if he is not firm. Generally speaking, the current need not exceed $1\frac{1}{2}$ milliamperes. The author uses only 1 milliampere for 15 to 20 seconds even for the largest hairs. Platinum needles are not regarded as necessary. The moral or psychic preparation of the patient is important. She should be warned not to expect great results at first, and the treatments must necessarily be somewhat protracted.

Mere down upon the lips is best left alone, or merely bleached now and then with peroxide solution.

It is preferable at first to choose the young hairs, because the papilla belonging to these are very active. A good light is the first essential, daylight being preferable to artificial. The needle will be found to penetrate better when the circuit is not made.

Loss of adherence of the hair to the papilla is a more valuable sign of destruction of the papilla than the classical one of "frothing" at the mouth of the follicle. It is useless and dangerous to attempt to destroy too many hairs in one place.

DIETETICS AND ORTHOPEDICS.

EDITED BY FRANK E. PECKHAM, M. D., PROVIDENCE, R. I.

The Relation of Diet to Heart and Blood-Vessel Diseases
By Louis Faugereres Bishop, M. D. (*Medical Record*,
September 28, 1912.)

The author begins by saying that diet is so easy to understand and on the other hand, the chemistry of food and nutrition is so complicated and hard to master.

In considering food, account is taken of only four or five ingredients. The important ones are proteins, carbohydrates, and fats. Water in the food is not of importance. Salt and ash in a mixed diet may be ignored. Variety is of great importance.

In heart and blood vessel disease, diet is considered more than half of the treatment. The increase in cardiovascular disease is due to the altered dietary of the present generation. There is a very definite relationship between the intestinal food activities and the heart muscle. This muscle is often impaired by the effects of the over ingestion of food, or the ingestion of the wrong kind of food element. The author believes that sudden deaths after public dinners are due to acute autointoxication from rapid disintegration of an excess of protein food.

The whole principle is in regulating the amount of protein and calories. The ideal diet for a patient with heart and blood vessel disease is bread and butter, with a certain amount of milk to supply the fluid, and enough cheese to make up the protein requirements without an excess of carbohydrates or heat units. On account of scurvy danger, fruit and green things must be added.

Dietetic Therapy. By William J. Mallory, M.D. (*The Virginia Semi-Monthly* for September 13, 1912.)

In dietetic treatment, the author speaks of the importance of diagnosis, both anatomic and physiologic, and of recognizing not only the change in structure of organs but the alteration in their function also.

Bickle has divided foods into weak and strong stimulants of gastric secretion. Starches, sugars, and fats are considered weak stimulants. A non-stimulating diet might include boiled beets, neutral albumins, cream, puree of well boiled vegetables, and would exclude raw or rare meats,

broths, and meat extracts. The author states that gout is very frequently accompanied by gastro-intestinal disturbances, but the nature of this disturbance is quite different in the various cases and, therefore, the diet which has been found suitable in one case is often not tolerated in another, hence a clear understanding of this disease and a better knowledge of the chemical and physiological properties of food is necessary.

Uric acid has two sources: first, that derived from katabolism of the body tissue known as endogenous uric acid and, second, that derived from the food and known as exogenous uric acid.

The endogenous uric acid can be reduced to a minimum by giving a sufficient amount of carbohydrates and fats to cover the heat and energy needs of the body and by regulating exercise.

The exogenous uric acid, which is derived solely from the food and is by far the most important, can be largely controlled by an intelligent selection of diet. Uric acid is derived solely from the purin bodies. Sweetbreads, liver, kidney, anchovies, and sardines head the list of meats containing purin bodies, while lentils and legumes are the only vegetables. Milk, butter, cheese, cereals, and fruits are practically purin free.

Knowledge of the above facts makes the writing of a diet in gout or any uric acid diathesis a simple matter. The author then discusses the therapeutics of water and salt.

FRENCH ABSTRACTS.

EDITED BY EDEN V. DELPHY, M. D., NEW YORK.

Syringomyelia, Radiotherapy; Notable Amelioration. Drs. H. Marques and H. Roger report the following case in the Archives d'Électricité Médicale, September 10, 1912. Mr. Antoine, butcher, age 29 years on March 6, 1912, entered the Suburbain hospital in the service of Prof. Rauzier, suffering from a weakness of the two superior members, especially the left. These troubles began about four years ago and have been so progressive ever since, that he has been obliged to abandon his profession. He has difficulty in using his hands even in eating. Recently there has been a weakness of the lower limbs, but without any subjective sensations. There is nothing of importance in his history, no syphilis. *Examination.*—Strength nearly normal in the lower limbs; very much diminished in the upper, especially the left. The movements of the elbow and the hand are those most affected, and there are some myoclonic twitchings and fibrillary tremblings. *Sensibility* equal and normal in the inferior members; in the superior, touch sense intact, pain sense abolished at the level of the hand, fore-arm and arm, heat and cold sense abolished

except in the upper part of the arm. *Reflexes*, antibrachial slightly diminished, knee reflex very active, plantar reflex with extension to the left. *Trophic condition*, very decided atrophy of the interosseous muscles and thenar eminence especially the left, traces of ulcerations on the palmar surfaces of the fingers. *Diagnosis*.—Syringomyelia. *Treatment*.—Radiotherapy of the spinal column. Seances every two days. Each seance 3 to 4H., filter 1 millimeter, rays 8 to 9, each seance applied to a different part of the spine. Interruption of treatment from the first to the fifteenth of April. Total number of seances, 34. *Results* at the end of June 1912,—considerable amelioration, consisting in an augmentation in strength and voluntary motion, especially in the left superior member. Defects in sensation very much ameliorated, but still persist to a slight extent in the left arm. Trophic conditions continue.

Syringomyelia and Radiotherapy. On reading the above report, Dr. G. O. Lotsy of Cairo, Egypt, sends the report of a similar case to the Archives d'Électricité Médicale, issue of October 10, 1912. The patient, *act.* 40 years, had contracted syphilis 19 years previously and was treated with mercurial pills during the first year; by fifteen inunctions and iodide of potassium during the second year. During the third year a diplopia occurred which disappeared after thirty-five injections of biniodide of mercury. Eleven years later he began to suffer from cephalalgia and lancinating pains in the extremities, which were relieved by specific treatment at Luchon. Two years later the cephalalgia and lancinating pains recurred and he was treated at Paris by mercurial injections but without relief. Since then the disorders of sensibility and muscular pareses have gradually supervened. He has himself noticed that heat and pain sensation is very much diminished on the trunk, shoulder and arms, while on exposure to cold there are pricking sensations especially on the forearms and body. The strength of the right hand, forearm and especially the deltoid muscle were diminishing more and more. A little later the muscles of the neck and the left forearm were also involved in the paresis. There was loss of sexual power and dimness of vision. An intense specific treatment did not ameliorate the symptoms in the least; on the contrary the muscular weakness increased. While in this condition he received eight seances of radio-therapy at Paris, upon the cervical and upper dorsal regions, which produced a decided amelioration of the motor symptoms, while the disorders of sensation were not at all influenced.

Status Presens. Nov. 18, 1910, a man of moderate height and fairly well developed but with his head and shoulders inclined forward. From the third to the sixth dorsal vertebra there is a decided scoliosis with the convexity toward the

left. The left arm is smaller than the right; the dorsal interossei of both hands are atrophied; the atrophy of the arms and the shoulders is less marked than of the hands; the muscular force is in proportion to the atrophy—much below normal. He cannot extend his arms laterally to a horizontal level, being arrested at about 30° from horizontal; in front he can raise them a little above horizontal, but cannot raise them to the vertical position. He cannot “square his shoulders.” The strength of the lower limbs is about normal, and the knee-reflexes are not increased. The pupillary reflexes are normal. Touch sense is nearly normal. Pain and temperature sense is much diminished on the upper part of the back, the head, the chest, the anterior part of the body and arms. Apparently the syphilitic virus has affected this patient during all these years as evinced by the diplopia and the lancinating pains. The cephalalgia and the pains in the extremities, seem to be of meningeal origin. The dissociation of the modes of sensation may also be found among the symptoms of syphilitic myelitis. However, the association of the four following factors: typical localization of the muscular atrophies, the dissociation of sensation, the complete failure of the intense specific treatment, the success of radio-therapy, all cause him to make the diagnosis of syringomyelia with localization in the cervical and upper dorsal regions of the spinal cord. The dissociation of sensation on the body and on the head prove that the gliomatosis has invaded the nucleus of the trigeminal also. *Treatment*: The upper part of the back and the neck being protected on one side with a sheet of lead, the spinal cord was irradiated diagonally so that the rays influenced the cord each time, the dose being two-thirds of a Sabaroud-Noire, and the penetration being 10 Wehnelt, the number of seances being four and the right and the left sides being exposed alternately with weekly intervals. One month later the disorders of sensation had not changed, but the arms were a little stronger, so light gymnastic exercises were recommended, and the series of four irradiations were repeated. Six months later he was able to move his arms in all directions and there was no limitations to the movements. The strength had notably increased; the scoliosis disappeared and the head and shoulders were more upright. The series of four irradiations were repeated. Thirteen months after the first irradiation, he feels well, and continues the gymnastic exercises. The disorders of sensation have remained stationary upon the body, but have notably diminished upon the arms. The pricking sensations of the hands under exposure to cold have disappeared, but continued on the trunk. The series of four seances were repeated. Grace to the technique the only reaction of the skin was a slight pigmentation. October 1st, 1912: His general state is good; his strength is still increasing; the disorders of sensation remain stationary.

The Journal of **Advanced Therapeutics**

VOL. XXXI.

MARCH, 1913.

No. 3

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STANDARDS IN PHYSICAL THERAPEUTICS.

The Pharmacopoeia, the standard of drug therapy, essays to place before the profession a list of drug or pharmaceutical preparations reputed to produce certain definite physiological effects in accord with corresponding therapeutic indications.

The standardization of the more definite, positive, physical agents—those which have been demonstrated to produce with uniformity certain therapeutic effects, and which are not listed in the pharmacopoeia, is an important matter. Very few, if any, of the medical profession, who have to do with the preparation of this revered and voluminous periodical, understand the principle of action of the agents listed in the category of physical therapeutics, particularly the various methods of employing electricity, radiant light and heat, and mechanical vibration and other important physical measures.

It is necessary, therefore, that those who are familiar with these methods should collaborate a system of standards not only as to physiological effects and therapeutic indications, but also to include the means employed—the apparatus in the hands of the profession for producing the various modalities.

The work begun three years since by the Committee on Standards of the American Electro-Therapeutic Association, which organization is properly the authority in these matters, has made three annual reports outlining a scheme of standards. In order to further this work, the committee requests the earnest co-operation of all the members and others who are interested in the establishment of definite, scientific standards.

At this time the foundations have been laid for the adoption

of well recognized principles. The reports of the special committees have outlined in each of the departments the methods and developments, setting forth the advances made from year to year, which afford valuable aid in the preparation of such standards.

With these and suggestions offered by members of the Association and others, the committee are instructed to make a complete arrangement of the various modalities employed in physical therapeutics and outline the physiological actions and therapeutic indications for each in accord with the most recent developments. The committee is also instructed to make a thorough investigation of the requirements of apparatus to best meet the various indications, in order that the young physician and those unfamiliar with the subject may be guided in the choice of apparatus, and that such standards will also guide the manufacturers to offer only efficient apparatus; such as will provide requisite armamentaria for the profession. It has too often been the case that manufacturers have aimed to sell to the profession various devices which were little short of worthless. To the uninitiated in these matters, who comprise more than nine-tenths of the medical profession, such products are often sold on the sole recommendation of the manufacturer, who knows little more of the requirements and purposes of the apparatus than the uninformed physician who thus becomes an "easy-mark."

Standardization, therefore, from the point of view of giving a better understanding to both the profession and manufacturers of requirements in point of employment, will place both upon a more stable footing. The physician will then be able to buy an adequate outfit because he is warned, and because the manufacturer will be able to put on the market only standard apparatus which will be for the same reason salable. He who then buys only from reputable manufacturers will stand small chance of being mislead. ●

TREATMENT OF VARICOSE ULCERS.

One of the leading medical weeklies is publishing a competitive series of papers on the treatment of ulcer of the leg, which

are presumably varicose ulcers. It is surprising how inadequate are the methods recommended for the treatment of a condition so promptly relieved by the employment of physical agents. In no instance is any reference made to the employment of radiant light and heat or the static brush discharge for the treatment of these cases—measures which in the hands of those who are familiar with the technique of applying them are uniformly successful, when employed in connection with systematic bandaging to prevent the recurrence of oedema.

The application of radiant light and heat for one-half hour daily, which can be done at the patient's home with a fifty c.p. therapeutic lamp or at the office of the physician, is capable in a large percentage of cases of healing these ulcers. In order to be more uniformly successful, however, or to heal them more rapidly, it should be employed in conjunction with the static brush discharge. No measure is so successful in removing infiltration surrounding varicose ulcers and thereby promoting the healing of the ulcer as the static brush-discharge. These ulcers must be considered the result of impaired nutrition of the skin from obstruction of the circulation by the infiltrating oedema.

Many simple cases have been known to heal following one thorough application of the static brush discharge. In most cases, however, it requires more, and in bad cases, daily treatment. In the less severe cases, treatment should be administered on alternate days with the systematic use of the bandage, which is indicated in all cases. The aim in treatment is to remove the infiltration, thereby softening the parts and restoring the circulation.

The fact that relatively few physicians understand these practical methods explain their failure to include them in their report of methods.

INTESTINAL STASIS.

The idea of Mr. Arbuthnot Lane as expressed at the Congress of Clinical Surgery, held recently at New York, that the dilated colon, as present with obstinate constipation should be surgically removed, is another indication of surgical mania.

The recommendation of this surgical procedure presumably looks to the institution of another major operation without a proper consideration of other things that could be done to relieve the patient by measures not severe or dangerous. The presumption that the condition of a human being would be improved with the colon removed, when the colon occupies such an important part in the economy, should not be treated lightly, except in cases of malignancy or extreme dilatation.

Those who are unfamiliar with the uses of physical measures for the treatment and cure of chronic constipation with dilated colon, with or without vascular stasis of the splanchnic vessels may possibly be excused for inventing a method so severe. Those, however, who are familiar with the success of high enemas associated with the systematic use of mechanical measures—the static wave current, and applications of mechanical vibration to the abdominal organs and the nerves supplying them—would not resort, except in extreme cases, to measures so heroic.

Abdominal stasis presents phenomena in most cases, which are associated with gastric and cardio-vascular disturbances, resulting from intestinal putrefaction, from which also arise other disturbing conditions, which may likewise be regulated by the systematic employment of mechanical measures. The *cardio splanchnic phenomena* as described by Abrams, in which the patient's pressure is from four to eight millimeters of mercury higher when lying than when sitting, and the pulse, at the same time, a number of beats faster when lying than when sitting, suggests, when present, a condition of intestinal stasis with dilatation of the abdominal vessels, a condition which is uniformly found in such cases, and easily corrected and controlled. The indications in these cases are invariably to remove obstructions and restore tone to the abdominal viscera. This is easily accomplished by two procedures, first, the application of mechanical vibration for approximately five minutes, alternately for fifteen seconds each over the posterior nerve roots between the transverse processes of the second and third, third and fourth, and fourth and fifth, and sometimes between the fifth and sixth dorsal vertebrae on both sides. The effect will often be, by the application of this measure alone, to reverse the phenomena of pulse and pressure, and at the same

time lower both pulse rate and blood pressure. This followed by the application of the static wave current with a large abdominal plate over the abdominal organs for twenty minutes, will restore the tone and activity to the sluggish conditions present in these parts, overcome the constipation and at the same time restore tone to the abdominal organs. In some cases, in which the abdominal muscles have become relaxed and the stomach and colon, as shown by a skiagraph, are low down in the abdominal cavity, a proper corset to support the abdominal viscera will give necessary added relief and render the removal of these organs by surgical measures an absurdity.

It is unfortunate that so much publicity has been given to a procedure so irrational and fraught with so much danger to the life of the individual, for it is not even justifiable to submit a patient from the ward of a hospital to the experiment, except in extreme cases of irremedial dilatation or malignancy.



REFLEXOLOGY AND REFLEXOTHERAPY.*

BY LOUIS VON COTZHAUSEN, M.D., PH.G., PHILADELPHIA.

In my review of Abrams' Spondylotherapy, and in my editorial in the June issue of the *Philadelphia Journal of Physiological Therapeutics*, I objected to the word "Spondylotherapy" being used by the author himself and by others for Abrams' work, because spinal-therapy is only a subdivision of his treatment, and by no means covers even one-half of the field and still less explains his theories, conclusions, diagnoses, etc. His teachings are in reality a special science and therefore I consider "Reflexology," the "Science of the Reflexes," the proper name for them.

It is, of course, impossible to do justice to his work in a short paper, and I will therefore restrict myself to a few general achievements of the man, which seem undeniable, and beyond doubt; and at the same time will mention the following of the doctor's statements, which are rather progressive or revolutionary, but at the same time seem true:

All text-books on "Diagnosis" are obsolete. Angina pectoris, if associated with cardiac dilatation, is curable. No disease is ever cured absolutely, but simply symptomatically. Cardiac murmurs are unimportant, provided the heart muscle is still adequate to do its work properly. Concussion, pressure, or sinusoidalization of the 7th cervical vertebra contracts the heart, aorta and blood vessels, and will cure murmurs due to dilatation. Likewise, it relieves aneurysmal murmurs, cures aneurysms symptomatically, if due to dilatation; and also angina pectoris, if associated with cardiac dilatation. It will cure hyperthyroidism, if the enlarged thyroid is vascular, and, in short, it will cure, or at least benefit every trouble due to lack of tone in the vagus nerve, such as congestions of the eye, ear, nose, lungs, coughs and vaso-dilator neuroses of all kinds.

Concussion of the 10th dorsal vertebra, pressure or sinusoidalization will have just the opposite effect, i. e., it will make all the above troubles worse, bringing on the murmurs again by causing cardiac dilatation, etc., but will remove murmurs due to spasm or contraction—symptoms all due to vaso-constrictor neuroses.

*Read on September 4, 1912, before the fourteenth annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

Aneurysmal murmurs and dullness will be increased.

Freezing between the 1st and 2nd cervical vertebra inhibits functional activity of the spinal branch of the trigeminus and mitigates the pain of trigeminal neuralgia. Pressure produces the same effect. Freezing between 2nd and 3rd C. will inhibit irritability of the phrenic nerve and thereby relieve pleural and pericardial pains, and pains due to a distended liver-capsule, or enlarged spleen, or implicated gall-ducts. Freezing or pressure of the 1st to 7th C. inhibits irritability of the cervico-occipital nerve and relieves headaches, pseudo-œsophagismus, pseudo-mastoiditis and cervico-occipital neuralgia.

Pseudo-appendicitis with swelling and pain should disappear when the 7th D. is concussed or frozen.

Concussion of 4, 5 and 6 D. spinous process, or freezing, should relieve pains due to liver and gall-bladder troubles. It is used for catarrhal jaundice and infected cholecystitis, for drainage. It also contracts the gall-bladder and pancreas.

The same treatment of the 9th D. spinous process distends the gall-bladder; if not C. spine, it suggests chronic cholecystitis.

Thyroid enlargement is curable by concussion of the 7th C. spine, provided it is vascular and not parenchymatous.

The vagus is stimulated by concussion of the 7th C. by intercostal pressure, by forced bending of the head backwards and by Laborde's method of repeated tongue traction, and is depressed by concussion between the 3rd and 4th D. The former contracts the heart reflexly and the latter dilates it.

The lower border of the lung descends, if normal, if the vagus-tone is increased; it may be prevented by adhesions.

Concussion of the 7th C. spine is indicated in aneurysms, vaso-dilator neuroses, pertussis, hyperthyroidism (simple or exophthalmic goiter), congestions of eye, ear, nose, lungs; myocardial insufficiency, angina pectoris with dilatation, diabetes and nervous deafness.

Pressure over the 7th C. causes retraction of the eyeballs, and between the 2nd and 3rd D., protrusion.

The tachycardia, flushing and tremor of exophthalmic goiter are greatly improved and often cured by concussion of the 7th C., the goiter somewhat decreased in size, but the exophthalmos frequently remains. The latter is caused by con-

traction of Mueller's muscle, attached to the bony orbit and inserted into the sclerotic coat of eyeball and innervated by the cervical sympathetic, which may explain why toning up the vagus does not benefit it. Again, the presence of orbital fat may cause the protrusion. Concussion of the 7th C. will cure all other symptoms, Abrams claims, while concussion of the 3rd and 4th D. will produce or aggravate them.

Bronchial asthma is caused by a spasm of the circular fibers with an inability of the longitudinal fibers of the bronchi to expel the imprisoned air. Therefore the remedy is stimulation of the lung-reflex of contraction. Cocainize the nose to prevent any possible irritant from producing the lung-reflex of dilatation and then use concussion or sinusoidalization to the 4th and 5th C. This will bring relief unless the asthma is due to vagus hypotonia instead of hypertonia, when stimulation of the 7th C. brings relief.

Adrenalin chloride in 8 to 15 min. doses, hypodermically, brings about lung contraction, and may prevent bronchial asthma.

Concussion over the 3rd-8th D. produces rapid dilatation of both lungs, and is good in atelectasis and to prevent children's bronchitis from turning into pneumonia.

Pilocarpin in 1/10 grain doses is the ideal heart tonic, as it stimulates the vagus. Strophanthus is the most rapid stimulant of the cardiac branches of the vagus. Atropin diminishes the bradycardia or arrhythmia of the heart, if caused by direct or reflex stimulation of the vagus.

Atropin inhibits and pilocarpin intensifies intestinal action.

Eye-strain is equivalent to vagus stimulation, which is caused by it.

Dull spots in phthisis are often not noticed early unless the lower end of the sternum is pressed in tightly during percussion.

The reason why poultices, liniments and counterirritants are beneficial in lung troubles is because their effects over skin is to cause lung dilatation.

Dull areas, supposed to be consolidation spots in the lungs, are frequently due to atelectasis and clear up after simple friction or concussion of the 7th C. spine.

Pressure between the 3rd and 4th D. relieves pain in the abdomen during the menses; depresses the vagus and relieves hypertension.

Concussion of the 1st, 2nd, 3rd L., especially of the 2nd, contracts the stomach, intestines, spleen and uterus. It is indicated in dilated stomach and dyspepsia due to motor inefficiency, and in hepatic congestion, atonic constipation, enlarged spleen, subinvolved uterus, pseudo-fibromata and hemorrhage of the uterus.

The claim that enlarged spleen is reduced by electricity or cold water is not proven; both dilate the overlying lung, which makes the spleen seem smaller. It is contracted, however, by concussion of the 2nd L. In ague-cake this is the remedy. It will bring on a characteristic attack of malaria, contraction of the spleen throwing the malaria plasmodia into the circulation, where the antibodies destroy them. By repeated treatments such spleens can be permanently reduced and the patients cured.

Pilocarpin is better to cure malaria than quinia—both stimulate the vagus.

All the reflexes were demonstrated visibly under the x-ray. The static wave current will not bring on the same reflex; not like concussion.

Eclampsia in pregnancy may be due to lack of compensatory thyroid enlargement. Thyroid medication will cause tube-casts and albumen to disappear.

In outlining the stomach by percussion stimulate the vagus by intercostal pressure and by concussion of the 7th C. spine.

Concussion of the 4th and 5th C. causes lung contraction, and of the 3rd-8th D., lung dilatation.

The sympathetic nervous system is divided into autonomic—essentially the extended vagus nerve—and ganglionic, which is stimulated by adrenalin, which depresses the heart, while stimulation of the vagus strengthens the heart.

The vagus not only inhibits the heart, as is usually supposed, but has tonic contracting fibers. Its irritation puts the heart into a condition of muscular rigidity.

Concussion of the 5th D. dilates the pylorus, tilts the stomach vertically and empties the contents into the duodenum. In percussing the stomach have patient lean back, or press into the intercostal space, or concuss the 7th C. and dullness will appear.

Abrams' Treatment for Infantile Paralysis: Concuss over the spines from the 9th D. to the 1st L., preferably the 10th D.

to increase the blood supply of the spinal cord, to improve the vascularization and to provoke the spinal reflexes to work the peripheral muscles; and use central sinusoidalization to the spine. The concussion will dilate the anterior and posterior spinal arteries and will waken the spinal cord.

In optic nerve atrophy the sinusoidal current to the 10th D. will increase the blood supply to the eyes and may improve the vision. Amyl nitrite might do the same.

In ulcer of the stomach there will be found a sore spot on the left side of the 11th D., and in cholelithiasis on the right side.

A properly fitting belt—abdominal—will not raise the organs in splanchnoptosis much, but will by pressure relieve the congestion in the splanchnic circulation, and ought to be worn until the abdominal muscles are developed by sinusoidalization or exercise to take its place.

Pressure between the 3rd and 4th D. will anesthetize the pharyngeal mucosa for treatment or passage of the stomach tube. After pressure of the 5th D., and consequent opening of the pylorus, we can introduce a tube into the duodenum, at once instead of having to wait an hour, and can then examine the duodenal contents for amylopsin and also diagnose disease of the pancreas.

Concussion of the 10th D. dilates the blood vessels and is beneficial in locomotor ataxia and in Bright's disease, by causing better and more rapid excretion of the uræmic poisons in the latter, increasing the functional activity of the kidneys, promptly increasing the red blood corpuscles 100,000 to 600,000 to the cubic millimeter. It is, therefore, excellent in phthisis and anemia. Concussion of the 7th C. decreases the number of red blood corpuscles very decidedly by contracting the blood vessels, heart and aorta, and is indicated in plethora, aneurysms and diabetes.

In nephritis the blood pressure has been reduced in one case from 180 to 152 mm. by percussion of the 10th D. Again, the blood pressure was reduced by concussion of the first 3 L. s., which contracts the liver and evacuates indican immediately into the urine.

Concussion of the 7th C. causes anemia, and of the 10th D., hyperemia of the retinal vessels.

If tabetic optic nerve atrophy is caused by obstruction of

the arteria retinae centralis, concussion of the 10th D. may relieve it.

The patellar reflex can be temporarily produced by concussion of the 2nd L.

Concussion of the 12th D. will contract a hypertrophied prostate, if still muscular.

Chromium sulphate is vasotrophic and acts in enlargement of the prostate and in exophthalmos, but not in tabes.

Lumps in the breast, due to spasm of the pectorales, will disappear after freezing the painful spots in the spine.

High blood pressure does not prove the presence of arteriosclerosis. A blood pressure of 185 mm. in one case was immediately cured by raising up a sagging abdomen, which was accompanied by dullness in lower abdomen, due to blood accumulation, causing obstruction in the general circulation with high blood pressure—Nature's compensation to maintain the circulation.

Concussion of the 3rd and 4th D. reduces blood pressure. Don't use it in such cases, but concuss 7 C. and thereby strengthen the heart. If blood pressure then falls the high blood pressure was compensatory.

Anything irritating the nose, like ammonia, stimulates the vagus, *f. e.*, tobacco. All European and African, but not American cigarette-holders contain cotton to prevent heart action through irritating the nose during inhalation.

For epistaxis strike the 7th C. or apply pressure or use the sinusoidal current.

Tests for intra-abdominal insufficiency: Lift up the abdomen, when the pulse becomes stronger, the heart tones louder and the border of liver and heart higher.

Dullness in the abdomen, due to congested blood, is removed by deep breathing, by concussion of 7 C. or 2 L., by exercising the abdominal muscles by sinusoidalization.

Develop the latter and wear a belt in hernia and the latter may soon be cured.

Concussion of the 10th D. may relieve dropsy in feet.

Abrams' spondylotherapy is clinical physiology, he claims.

Inhalation of ether causes the longest and largest stomach dilatation.

Post-anesthetic nausea is prevented by cocoainization with 2 per cent. adrenalin in nose.

The heart can be contracted by scratching the precordial skin.

Aneurysm with cardiac dilatation is curable in 10 treatments usually.

The aorta undoubtedly has muscular contractility.

Concussion of the 7th C. will stop hemoptysis. Concussion of 10 D. for 6 weeks may cure early phthisis.

Test for reliability of the sinusoidal current: Apply a large pad to the sacrum and a smaller one to the 4th and 5th C. when, if current is good, the lung will at once contract.

Atropin paralyzes the motor endings of the vagus.

Adrenalin stimulates and maintains the sympathicotropic action

The pancreas has an inhibitory action on secretion of adrenalin.

Pilocarpin maintains the tonus of the autonomic fibers (vagotropic action).

Concussion of the 9th D. enlarges the gall-bladder. Cholecystitis may prevent this enlargement.

Concussion or application of extreme cold to the 4th, 5th and 6th D. removes pain from the liver and gall-bladder.

Concussion of the 7th D. will remove swelling and pain from the appendix. Freezing is better.

Adrenalin contracts the longitudinal fibers of the bronchioles, causes lung dullness, and relieves bronchial asthma. It is best given hypodermically in doses of 5 to 15 minims.

Adrenalin dilates and pilocarpin contracts the stomach.

All the above claims are made by Abrams. Most of it seems proven also by him and by Jaworski, Laborde, Fliess, Bonnier, Denslow and lately by his American students, among whom we may conscientiously class some of our most progressive and enthusiastic physicians and physiotherapists. Quite a number of the reflexes have been tested by myself, both for experimental and curative purposes, with usually very satisfactory but, of course, not invariably with successful results. As we all know, too well, there are no treatments and no remedies in existence, which prove universally successful. If we allow for possibly mistaken diagnoses and again for individual idiosyncrasies and existing complications, the results obtained have been very promising in most cases, and

in a few almost miraculous, surprising me apparently, if anything, more than the patient. I might, of course, continue this article almost indefinitely without, however, serving any good purpose. If I have succeeded in arousing sufficient interest in you in these treatments, even if your present firm intention is to disprove and condemn them, this paper has served a good purpose.

RHEUMATISM.*

ITS TREATMENT BY THE DIRECT CURRENT, HIGH FREQUENCY
AND MEDICINAL AGENTS. HAPPY RESULTS OBTAINED
BY THE COMBINATION OF THESE REMEDIAL AGENTS.

BY ROSA D. WISS, M.D.; MERIDIAN, MISS.

It is with genuine pleasure that I come before this body to-day, for I feel that I have a subject which appeals most strongly to every true physician. Someone has said that there is one special way to reach the sympathies of each individual, some chord, which being struck, sets in vibration the energies of the entire being. It was illustrated thus: The lawyer may be indifferent to all else, but the slightest infringement of the law calls into activity his every sense. The preacher is keenly alive to the ravages of sin, and his soul answers the call for help against the evil one. The school teacher may become unsympathetic to most of the needs of life, but the call for relief from blinding ignorance wakes all of his energies into life, and the poor old tired doctor is never too weary to be appealed to by the call of pain. If this be true, then I am right in saying that my subject appeals to you, for no disease can boast of having caused more pain than rheumatism. Other diseases may give more pain during a specified unit of time, but rheumatism has held its sway through the ages, working unceasingly upon the bodies of men until its accumulated weight of pain has almost overwhelmed the race.

While it is true that rheumatism has been the cause of much of the pain of the human race, still, like other things that have caused much harm, it has been blamed for many aches and pains for which it was not responsible.

*Read on September 4, 1912, before the fourteenth annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

In the remarks which follow I shall confine myself to true articular rheumatism, assuming that the correct diagnosis has been made. I shall not take up your time in discussing differential diagnosis, as I am sure you, my hearers, know as much about this as I do.

As to etiology, I would say that there is still much doubt in my mind as to the true cause of rheumatism. It may be true that there is a special germ causing rheumatism, or, as one of my colleagues has suggested, it may be that rheumatism is only a general condition of the system, with local manifestations, and not a disease in itself; or, again, it may be that the old uric acid diathesis of which we heard so much a few years ago was true. I don't know. May it not be true that all of these theories as to the cause of rheumatism are true, not conflicting one with the other, but each doing its part towards producing the disease? We know that faulty metabolism, causing an accumulation of waste matter in the system, with poor elimination, is always present in rheumatic subjects. This faulty elimination may produce the depressed condition spoken of by my colleague, who thinks rheumatism a condition and not a disease. We also know that we always have an excess of uric acid in the urine of these patients, with frequently a suppression of urine and sweat. Now, if rheumatism is a germ disease, did the germ, gaining access to the system, bring about the faulty metabolism with excess of uric acid, or did these conditions exist already, making a fruitful field for the development of these germs, which in turn gaining access to the body produce the disease known as rheumatism? All this, however, is only theory, and is really not part of my subject.

We may not know the cause of rheumatism, but we do know that it exists, and the poor rheumatic patient, if he can only be cured, does not care what caused the trouble or how the relief was obtained.

For the past fourteen years my attention has been largely directed towards the treatment of rheumatism. During this time I have successfully treated about one hundred cases.

The first cases of the series were treated with medicinal agents alone, as at that time I was not using electricity. These cases were cured, but it took a long time to accomplish a cure.

As I said before it does not matter to the patient what caused rheumatism, or how it is cured, just so he gets well. To the true scientist, however, and every true doctor should be a true scientist, both of these questions are of great moment. We should be ready to give a reason for the faith that lieth in us.

In all of my cases I found the liver more than any other organ to be most at fault, so my efforts have been directed toward that organ. During the first years of my electric work I only worked with the direct current. I was delighted with the results obtained by treatment with this current, so much so that I left off the medicinal agents which I had been using. These cases got well after a good bit of treatment; I found, however that they did much better when medicinal agents were judiciously given in connection with electric treatment. I also began to make large and satisfactory use of ionic medication. Iodine applied, of course, from the negative pole over the affected joints gave fine results.

After working with the constant current alone for about six years, I began work with the high frequency. I had heard and read so much about this remedial agent that I expected to be able to discontinue the more tedious and less showy work of the direct current for this wonderful and beautiful work. But here again, I was mistaken. Pain was relieved and the patient made to feel better, but the trouble returned. Then I went back to my first love, the constant current. I found, however, that much quicker and better results were obtained here by using first the constant current, then high frequency applied with vacuum body electrodes; this in turn followed by auto-condensation. Vibration over the back along the sides of the spinal column, especially in the lumbar and dorsal regions seemed to help greatly in these cases.

I have selected one case from my one hundred to report in detail. This case is so clear cut and pronounced in every respect that a close study of it will be sufficient to cover all cases of articular rheumatism.

The patient is a man, age forty years. Occupation, passenger conductor. First attack occurred fifteen years ago. The affected joints were both ankles and the great toe of the right foot. The first attack was very sudden and violent in its onset, running the usual course of inflammatory rheuma-

tism. Fever was very high and lasted for weeks with terrible swelling of the joints. He was under the care of one of the best physicians of his city. All the usual remedies were used. After the acute attack subsided he never regained the full use of his feet, and, as he expressed it, was always conscious of ankles. A second attack soon followed. These exacerbations and remissions of symptoms have continued for fifteen years in spite of treatment at the hands of regular physicians, osteopaths, quacks, two visits to Hot Springs; in fact, everything that money and friends could get except electricity. The attacks became more and more frequent until he became practically disabled all the time. He became my patient May 15th, 1912. At that time was in the midst of a very bad attack. During this attack the right knee and the little finger of the left hand were badly involved for the first time. My treatment was as follows:

The patient was first placed on a table with a large clay pad under the middle of his back. A large piece of lead protecting metal was placed under the pad and connected by a copper wire to the positive pole of the wall plate. Each affected joint was then painted with tincture of iodine. A large, well moistened clay pad was then placed over each affected joint. These pads were in turn covered by a large piece of lead-protecting metal, connected to the negative pole of the wall plate. The current was then turned on very gradually. By this gradual turning on of the current as much as fifty or sixty milliamperes could be borne with ease to the patient. This current was allowed to run thirty minutes. After this, the patient in a sitting position, was given a sinusoidal treatment of twenty minutes. This was given by having the feet in a tub of very hot water, the water extending above the ankles. Under each foot was placed a piece of lead-protecting metal the size of the foot. These electrodes were connected by copper wire to the sinusoidal machine by having the bared ends of the wire wrapped tightly around the terminal of the cord, connecting the hand piece to the machine. The hand pieces were wrapped in wet cloths and tightly grasped. Thus the sinusoidal current was applied to the hands and feet at the same time. I have described this in detail as some of you may be glad to know that you can make such a good outfit at so small a cost, this cost being one dollar and a half for an enameled foot tub.

After the sinusoidal treatment each affected joint was given a high frequency treatment by being rubbed about five minutes with a vacuum electrode. The spine was then vibrated for five minutes. The poor old patient was then placed on the auto-condensation couch with a current of 450 milliamperes turned on for ten minutes. He went to sleep during this treatment. That night before retiring the affected joints were rubbed with the following prescription:

Tr. Opii, Tr. Aconit, Tr. Belladonæ, Tr. Iodine, Salicylic Acid, Lin. Saponis—equal parts.

Then the joints were done up in hot anti-phlogistine and well bandaged. The patient was given the following prescription to take internally:

Hydrog. Chlo. Cor..... grj.
 Hydrog. Chlo. Mit..... gr. XXX
 Ext. Colocynth Comp.....
 Pulvis Ipecac
 Podophyllinaa.... gr. VI
 Leptandrin

M et ft. caps. No. 30.

Sig—Two at bedtime taken one hour apart.

In addition to this the following prescription was given:

Sodii Salicylate ʒii
 Milk of Magnesia.....q. s..... ʒiij

M et Sig. Teaspoonful in water every two hours if needed for pain.

The patient slept well that night, and to my delight all of the affected joints were much improved. The inflammation, soreness and swelling were almost all gone. I will admit that I was amazed at the improvement. I had never before used so much treatment at one time, nor had I ever seen so bad a case. In fact, my only reason for using so much was the desperate condition of the patient. Nothing before had ever stopped one of these attacks.

I gave him another treatment of the same kind the next day. The following day he was so much better that he called himself well, declaring that he was going to make his run the next day. He is a passenger conductor on a local between Meridian and New Orleans, La., a distance of two hundred miles, a tedious heavy run, with a stop at every little station. To my delight he made the trip to New Or-

leans and back to Meridian without the slightest discomfort. He had had no unpleasant reaction, which I had feared would come from so heavy a treatment of constant current and vibration. We know these reactions come from the liberation of toxins. I feel sure that the reaction in his case was avoided by the high frequency and auto-condensation treatments, and the brisk liver purge. I have since made it a rule to follow all of my constant current and vibration treatment with these agents, and in every case the unpleasant reaction has been avoided.

My conductor has continued well all summer in spite of the fact that we have had such heavy rains almost all the time. The treatments were kept up for some time when the patient came home from his run, not so much that he seemed to need it, but we were just afraid to stop.

Before he became my patient the doctors had him on a strict rheumatism diet. For five years he had not tasted beefsteak, beets, tomatoes, strawberries, etc., and had continued to have these awful attacks almost all the time. I let him have what he wished. He had eaten everything in the forbidden list this summer, and has had no rheumatism. I have never dieted a rheumatism patient.

I have reported this case in detail, at the risk of being tedious, so as to bring the case and the line of treatment clearly before you. It is a wonderful thing to be able to abort these attacks. I have not always used so much treatment in my cases as in this one, but have used in each case what I thought was best, doing as Dr. Bishop tells us, studying the physiology, the pathology, etc., in each case, and by studying the physics of electricity, applying the current indicated to meet the demand.

The restoration of the above mentioned patient is quite a triumph for advanced therapeutics. He is one of the most popular men in our section of the country, and his recovery is looked upon almost as a miracle. Many others have come to me because of this case, and, by following out these lines of treatment I have always had success.

Discussion.

Dr. Henry W. Frauenthal, of New York: Any one familiar with the pathology of gout I think would accept the history

of the patient as a clear case of gout. It started in the big toe, foot and ankle. Later it involved the knee and finger. I think it is a case in which an x-ray would have been of great assistance in confirming the diagnosis and showing the exostosis. I do not think there is any disease in which there has been so much done in a scientific way to make a differential diagnosis as in rheumatism. Most of our rheumatic attacks now are types of attenuated bacteria. Most of our cases are diplococcus infection, usually through the throat. In the types of rheumatism, generally speaking, which are not proven by diplococcus in the blood, respond to salicylates very much like malaria responds to quinine or syphilis to mercury, and I do not think that in any joint case reported—I mean a single case—that we would be far amiss if we would produce x-rays to show the condition of the joint. The thing to do is to have a clear diagnosis before we prove by our treatment that our prognosis was correct.

Dr. Massey: Would the x-ray add to the clearness between gout and rheumatism in that case?

Dr. Frauenthal: Infinitely. I think that any authority will accept the fact that a trouble like this beginning in the toe and involving the other smaller joints cannot be anything else but gout. When we have any condition of the joint brought before an association of this kind it should be accompanied by an x-ray. It is the thing we are best able to make our differential diagnosis on.

Dr. John W. Torbett, of Marlin, Texas: I wish to express my appreciation of the paper, because it is along the line of work that I do. I have more cases of what is called rheumatism than anything else.

I want to add my approval of the shotgun prescription for the liver. You will fail if you use calomel alone in the South.

I think the focus of infection should always be looked after, in the tonsils, teeth, throat or bowels.

The peculiar thing about her case was that he got along better on a generous diet. Perhaps he had been starving himself. The old doctors tell them to quit coffee, tea, meat, etc., and do not tell them what to eat. It was probably an auto-toxic type—call it gout or what you want to. Most of these cases are probably a combination of infections and impaired elimination.

About cataphoresis, you can find the iodine in the saliva if you use enough of it. I have used the same method that she used on hundreds of cases, and it is inexpensive. I ran across a prescription in the *Deutscher Klinik* for June which is very beneficial. It consists of one part of salicylic acid, one part of turpentine, four parts of sulphur, and from four to six parts of lanolin. The first case I used it on was a case of multiple arthritis which had been supersaturated with salicylates. They had not produced results. I did not give baths as I usually do. I simply wrapped all of his joints with this salve. At the end of the first week he was able to be up and around. I have not had a chance to use it on many cases, but I got splendid results on every case I tried it on.

I believe in a diet low in proteins, but in her case the diet was probably too low. I believe in writing down on paper just exactly what the patients should do.

Dr. Wiss: I carefully refrained from differential diagnosis. This may have been gout or it may have been rheumatism. The principal trouble was in his ankles. While he did have some trouble in the toe, the greatest trouble was in the ankles. Whether it was gout or rheumatism, I do not know. We do know this: this man knew he had something the matter with him, and I did, too, and now he knows he is well. I did not discuss the differential diagnosis; it was a little new to me.

Dr. Frauenthal said that I ought to have had an x-ray picture. I am sure now that I did wrong in not having one made. He is well now and we can't get one as his ankles are all right.

This patient had always been strongly opposed to women physicians, and he had only come to me as the very last resort. He said he was willing to have a woman osteopath treat him, but when he had a doctor treat him he wanted a sure enough doctor. When he came to my office he had been treated by my colleagues, and I never thought about an x-ray picture. I am afraid if I had told him at first that I must have an x-ray picture he would have left me.

THE TREATMENT OF RESPIRATORY DISEASES BY OZONE COMPARED WITH THE TREATMENT BY CURRENTS OF HIGH FREQUENCY.

S. J. WRIGHT, M.D., AKRON, OHIO.

Many infectious diseases result from the invasion of bacteria into the naso-pharynx or mouth. To contribute to their destruction is to fight the patient's battle with him, as well as to render the tissues involved surgically clean and ready for real surgery. This is done by local treatment, before the infection has become general.

Tincture of iodine and nitrate of silver destroyed bacteria ages before Pasteur was born. They are, however, inadequate owing to the anatomical peculiarities of the upper air tracts.

The guillotine and curette become infected by the infected field at the very beginning of surgical interference and may prove fatal. Hence the demand for a mode of treatment which shall compare with appendectomy as a surgical procedure.

Is it unfair to say that the abdominal surgeon has achieved a more nearly perfect technique than the rhinologist? In one case an infected instrument is thrown aside; in the other it is used only after infection. Hence the demand is for means of preventing infection and of correcting it as soon as possible.

The cold abscess and the white swelling are evidences that the natural efforts to repulse the enemy have proven futile and are abandoned.

Reaction, as indicated by heat, swelling, redness, pain, loss of function, phagocytosis, or increased chemiotaxis, is evidence of a battle with invisible enemies; therefore to establish a reaction is to help the patient fight his battle.

Walling off and tissue necrosis followed by extrusion through skin or membrane are processes too familiar to us. In such cases the patient largely fights his own battle. Phagocytosis has failed to arrest the progress of the enemy within the body. They are turned out to die.

The theoretical inadequacy of methods, apparatus, or influence, must give place to the testimony of clinical results.

The immortal Helmholtz said that if an instrument of pre-

cision ordered by and furnished to him were found to be as inaccurate of construction as the average eye is, he would refuse to accept it from the manufacturer. But knowing what the eye actually does, criticism gives place to admiration. It is to clinical results, imperfect though they are, rather than to clever theories that the writer desires to call attention.

One must actually employ and observe the results of the use of the currents of high frequency and of ozone to be able to arrive at an estimate of their value in treatment. Their effects are both local and general. The one penetrates the deepest parts of the tissue; the other is carried in the blood stream to every tissue. Both agents are safe and easily administered. The bipolar high frequency can be made to pass from one mastoid process to its fellow, through the head. As there is no anatomical barrier, air may pass from the nose to the mastoid cells, also ozone by the law of general diffusion of gases. Ozone penetrates the nasal accessory sinuses promptly and with healing power.

Applied by glass vacuum electrodes, the current creates ozone within cavities and upon surfaces. Thus the Schneiderian membrane, the eustachean orifice, the tonsils, the genito-urinary, and rectal canals may be treated directly. Clinical experience indicates the raising of the opsonic index by the electrified air as by the electrified electrodes.

Phagocytosis and chemiotaxis may also be increased, as suggested by Dr. Geyser. Arrested functions are quickened; glandular activities are stimulated and flagging powers of resistance reinforced by these modalities. Ozone soothes pain, doubtless by eliminating toxins from the nerve-supplying blood, or by altering their composition.

An infected maxillary sinus becomes painless after two seances, or even after one. The personal experience of the writer after thirty years, during which a maxillary sinus was drilled and irrigated for a term of years for four repetitions in vain, is a joy, and illustrative of the truth of the assertion.

The result of the combined use of iodides and ozone in laryngeal tuberculosis is mentioned by Dr. Pfannenstill, and has been verified by the writer. Enlargement of the parotid glands occurs, lasting a few days.

In coryza, ozena, atrophic and hypertrophic rhinitis, hay fever, rose cold, bronchitis, asthma of bronchial origin; in

infections of the eustachian tube, middle ear, and mastoid cells; in anemia, insomnia and neurasthenia ozone is valuable.

Quackery is of two varieties—positive and negative. The one asserts error, the other denies truth. The scientific mind avoids both errors. In the field of preventive medicine especially are the measures herein stated desirable. The sterilization of the naso-pharyngeal and buccal cavities would prevent systemic infections to a very large degree. They are destined, probably, to be widely and generally used by the entire race.

The importance of the study of the bacteriology of the *primae viae*, has of late been recognized by pharmacists, and germicidal drugs for local and internal use are daily becoming more popular. Vaccines and serums are also employed.

Surgeons can but regret the ill results and sequels of the instrumental treatment of tonsils and adenoid tissues; of spurs, septum deviations and infected accessory sinuses; as well as the prohibitive influence of infections in these regions against operations on the skull. Among the sequels are fatal sepsis, endocarditis, bronchopneumonia, fatal hemorrhage, septic meningitis, cerebral, or cerebellar, or sub-dural abscess, lateral sinus thrombosis, with or without pyaemia or mastoid abscess, or cellulitis, or erysipelas. Besides post operative spurs, deviations, rhinitis.



REPORT OF THE COMMITTEE ON STANDARDIZATION OF PHYSICAL THERAPEUTIC MEASURES.

WILLIAM BENHAM SNOW, M.D., CHAIRMAN.

During the past three years elaborate reports have been presented by this committee at the respective meetings.

The object of the committee from its conception was to standardize and place upon a scientific basis the indications and uses of the respective physical therapeutic measures, entailing a research into the physical properties and physiological effects of each.

This work necessarily involved therapeutic demonstration from the employment of the various modalities to confirm the physiological studies.

At the time this work was instituted a larger part of the work was found by your committee to be empiric; and we regret to say that such is still too often the case. Your committee finds that the earnest work of the members of the association is gradually evolving a scientific therapeutics which promises to be enduring. In the report of the committee presented last year, which was accepted, the principles set forth endeavored to consider the physical effects and their responses with their influence in producing various effects which so affected pathological conditions as to restore the normal state when possible.

This report was sent to each member of the association by the secretary with a request that the statements which were not in accord with the views of various members might receive criticism with suggestions for their correction. To this request there were no responses, which the committee cannot believe was entirely due to the fact that there were no dissenting opinions, but that owing to the usual stress of professional life the members had neglected to express their opinions.

The committee, for this reason, is making no additions to the report of last year as pertains to the subject matter of that report, but would propose to the association that now this matter be given earnest attention and that each member who would add to this report any essential material or suggest any changes would do so at an early date, and that the

committee then be authorized to redraft the report, and formulate for each class of conditions a systematic routine, this report, with the criticisms offered, to be first submitted to the research committee and then be forwarded in printed form to the members of the association for further criticism before publication, whereupon the committee would then carefully consider and correct the same for publication after the next meeting of the association. Your committee believes that if the work was revised and enlarged in this manner that at the next session the only subject to be presented and discussed would be those upon which difference of opinion existed. A report of this sort carefully formulated and revised would then serve as a standard of methods having the sanction and recognition of the association. It is probable that such a work would be the most representative index of the progress of physical therapeutics and would tend to place the science upon a basis which would lead to the general recognitions of these important methods and measures for which the association labors.

This is offered as a suggestion and we believe that the committee that may be appointed by the next president will be willing to assume the responsibility herein suggested.

The committee believes that these suggestions, if adopted, will further the scientific employment of physical measures.

Furthermore, we believe that this report should include not only a consideration of the modalities to be employed, but as far as is consistent, a consideration of the apparatus for producing these effects, this report to be in no sense directed against any manufacturer but to set forth the quality of effects sought in order that it might thereby assist the manufacturers in producing only types of apparatus that would produce the requisite effects.

Your committee believes that this will be most acceptable not only to manufacturers, but by producing a standardization of requirements, will further the manufacture of a really adaptable and scientific armamentarium.

Respectfully submitted,

Committee:

J. W. TRAVEL,
E. C. TITUS,
FREDERIC DE KRAFT,
WM. BENHAM SNOW, Chairman.

Discussion.

Dr. F. Howard Humphris, of London: We have been talking standardization for years. If we made a start on only one thing, say a vacuum electrode handle, I think we would soon be able to have a whole series of manufactured things that would be a help to all. We would then have something to go on, something to build up from.

On motion the report was accepted and placed on file.

RADIOTHERAPY OF THE SUPRARENAL GLANDS AND ITS HYPERTENSION EFFECTS.*

BY DRS. ZIMMERN AND COTTENOT.

I.

One of the most seductive studies in radiotherapy is that which treats of the irradiation of the secretory glands which are in a state of hyperplasia and hyperfunction. Following Williams (1902) we irradiate the thyroid body in the basedowian syndromes. Gramega (1) and Béclère (2) have shown the possibility of combatting gigantism and acromegalia when due to hypophysomegalia; and finally the x-rays have been tried in hypertrophy of the thymus by Friedländer, Myers, d'Élnitz, (3) &c.

The physiological experiments undertaken by one of us with Battez (4) have shown the possibility of obtaining by means of very elevated doses upon the thyroid body of the rabbit, the phenomena of hypothyroidism very similar to the signs which characterize experimental ethyroidisation. Zimmermann, Battez, and Dubus (5) have shown finally that with sufficient doses there is such a destruction of the cellular elements that, on section, it is difficult to find vestiges of the irradiated gland. On the thymus, similar researches have been undertaken by Rudberg, (6) Aubertin and Bordet, (7) then by Regaud and Cremieu. (8) These authors have shown the destructive action of high doses upon the corpuscles of Hassal.

II.

In consideration of the preceding results, it is logical to investigate, in the same manner, the effects of the

*Translated from the *Archives d'Electricite Medicale*, June 10, 1912, by Eden V. Delphey, M.D.

rays upon another gland—the suprarenal—the principal product of whose secretion we know. To our knowledge, this study has never been undertaken before. (9) For nearly two years we have applied ourselves to the study of the effects of the x-rays upon the suprarenal glands as much from the physiological and the anatomic-pathological as from the clinical point of view. Our first experiments upon healthy animals seemed to indicate an almost imperceptible effect of the x-rays upon the suprarenal glands. But it is far from being the same with patients suffering from symptoms of hyperfunctioning of the gland. It seems today sufficiently well established, since the labors of Vaquez, and of Josué, that the hyperfunctionment and the hyperplasia of the suprarenal gland occupies a preponderant place in vascular pathology. Hypernephritism is encountered in intoxications such as lead intoxication, auto-intoxication, and after infections. Vaquez, Aubertin, and Clunet have described the hyperplastic lesions of the supra-renal gland after autopsy in cases of bright's disease, where there was an elevated arterial tension during life. Although adrenalin can not be found in the blood of a healthy person, it has been disclosed, by means of chemical reagents and by Ehrmann's reaction, in the serum of patients suffering from chronic nephritis (Schur and Wiesel).

Injected in small doses and repeated for a long time, adrenalin produces atheromatous lesions and hypertrophy of the heart in rabbits (Josué). There are a number of facts which seem to demonstrate that atheromatous lesions, arteriosclerosis and the precursor functional troubles, such as hypertension are under the control of suprarenal hyperplasia and hyperfunctionment. Josué is very categorical in this regard, and his labors have shown the existence of a *supra-renal-vascular syndrome* characterized by hypertension, supra-renal hyperplasia, and cardiac hypertrophy. If it is thus demonstrated that hypertension is the result of functional superactivity of the supra-renals, it is legitimate to think that the x-rays, which we know in other circumstances to be endowed with a remarkable elective power upon the cellular elements in active reproductive activity, and as they diminish the pathological superactivity of the thyroid and pituitary gland, will be efficacious in raying the hyperplastic process of the

supra-renal. The obtainment of positive results ought at the same time to verify the basis of the supra-renal theories of hypertension, and enrich therapeutics with a new procedure which is qualified to combat, without doubt more powerful and more efficacious than any other, and moreover is addressed to the exact focus of, the pathological trouble of the responsible organ itself. It is therefore with this double purpose that we have conducted our labors upon the irradiation of the supra-renal capsules.

III.

The curves which we present show clearly that in the patients with hypertension, irradiated in the supra-renal region, there has been a more or less marked lowering of the arterial tension, and that the abnormal tension tends to return to normal. All these curves have been made according to the pressure indicated by a "Pachon." Without doubt there have been a certain number of criticisms of the oscillometer of this author, notably the difficulty of seizing the first oscillation crossing the line, which fact causes the intervention of a personal coefficient. Without doubt there is just reason in this, but the oscillometric method gives sphygmomanometric values superior to those of the Bush-Potain, or Riva-Rocci. But these objections are not so important, because they are *comparative measurements* and made with the same instrument. It is not the absolute pressure of which we have taken the measure, but the variations of pressure during the time of, and in proportion to the irradiations. That is not to say that we have employed the Pachon to the exclusion of other systems: we have often used other types (sphygmograph of Vaquez, without signal, for example), as a control to our results. By the aid of the Pachon, one can with the greatest facility, establish the two interesting values of the arterial system, the maximum or systolic and the minimum or diastolic pressure. Although in hypertension, the modifications affect the two pressures at the same time, our curves indicate only the values of the systolic pressure. Without rejecting completely the researches upon diastolic pressure which indicate only modifications of lesser importance, we have limited ourselves to the study of the maximum for two reasons: at the outset because from the standpoint of the path-

ological consequences of hypertension, the systolic pressure plays the much more important role, and also because, based on the documentary labors of Ottfried Muller and Blauel, who have conclusively shown the doubtful signification of diastolic pressure, we would expose ourselves to inexact valuations. (10) These authors controlling the indications of the sphyngo-manometers by those of the Kymographion, in members about to be amputated, have found a sufficient accordance with the figures given by the clinical apparatus as a measure of the maximum pressure, while in the diastolic pressure there have been disconcerting differences, amounting to several centimeters in 25 to 30% of the cases. It is well understood that the measurements were made with the most rigorous precautions. The arm-piece to the "Pachon" was not put in place until *after a horizontal repose of a half hour's duration*. The patients were seen and seen again at *practically the same hour*. There was *no change in their regime* nor in their habits during the treatment, and no other medication was instituted. We have also chosen patients having permanent hypertension, that is those having the same figures of tension taken in three readings, each two days apart.

In this manner we have been able to combine the observations upon sixteen persons in whom we have been able to follow the evolution of the pressure for a time sufficiently long to judge of the results obtained. Certain of our curves were continued through six months, and these show the maintenance of the lowered pressure for a long time after cessation of the treatment.

Five of our patients showed a pressure before treatment of 20 to 21 centimeters of mercury; seven, 23 to 25 centimeters of mercury; four, 26 to 31 centimeters of mercury.

In these sixteen patients one, only, retained his initial pressure, notwithstanding maximum exposures compatible with the integrity of the integument were employed. In all the others the lowering varied from 2 to 8 centimeters of mercury.

Two patients showed a lowering of 2 centimeters; five, 4 centimeters; three, 5 centimeters; three 6 centimeters; one, 7 centimeters and one 8 centimeters.

If a pressure of 16 to 17 Pachon be considered normal, it will be seen that according to our curves that the pressure of

7 out of 15 of our patients was reduced to normal. The 8 others, notwithstanding a notable lowering, now remain at the same level; two at 23, and six others between 20 and 21. The quickness with which the lowering was produced was variable. In certain subjects it was very rapid. In forty-eight hours after the first seance, the oscillometer showed a lowering of 3 to 4 centimeters. In others it was only after a series of seances that the lowering was manifested. In some the result continues without the need of more irradiations. Thus our patients, 1 and 5 remain normal after four months and No. 2 after six months. In others it is necessary to combat the tendency to a return of the hypertension by repeating the treatment (curve No. 3). In other subjects in which the lowering was difficult to obtain, the pressure has remained constant for several months (curve No. 4). At the same time that the pressure is lowered in these patients, there are important modifications in their subjective troubles. Thus are relieved more or less quickly, the cephalagias, dizziness, vertigo, ringing in the ears, dyspnoea on effort &c. A notable fact has been pointed out that sometimes the subjective troubles are lessened when the pressure is not particularly lowered. One of our patients complained for a long time of an intolerable weight in his lower limbs, and declared, after the first seance, that he was "entirely disburdened of the cannon ball" which dragged at his feet. The general condition of our patients and their habits of life were sensibly modified. Two obese, suffering from hypertension, claimed a perceptible diminution in weight. Unfortunately we have not been able to certify to the figures which have been given us, not having had a scale at our disposition at the beginning of our researches. Another with a congested facies, in whom a painful congested skin eruption interdicted a sojourn of some duration in a hot chamber, saw his trouble disappear completely. These pleasant modifications occurred at the same time and in proportion to the lowering of the pressure.

IV.

The anatomical data necessary for the irradiation of the supra-renals are the following: These glands are situated within the internal border of the kidney against the body of the vertebral column, and above the renal pedicle. When it is in the high situation, it corresponds to the twelfth dorsal

vertebra, and to the eleventh and twelfth transverse processes. In the low position, it is most often in relation with the first lumbar and second body. (Albarran).

When the kidney is ectopic, we know that the supra-renal gland is not displaced with it. According to Albarran, the capsule is one of the most fixed organs in the whole economy. Therefore intaking as the centre of irradiation, the transverse process close to the spinal column, one is certain to affect the supra-renal. We have never used any except the hard rays, indicating 9 to 10 by means of the radiochromometer, and filtered through one millimeter of aluminum. The neighboring regions are protected by means of a localizer, or by the aid of lead plates. The two supra-renals are each time irradiated, the one after the other. The tube was placed 15 to 20 centimeters from the skin, according to the case. At each seance the subject received in the neighborhood of 3H, (this dose being calculated in taking account of the coefficient of absorbtion of the filter). Thanks to the lessened sensibility of the skin of the back, we have been able, without damage, or a notable erythema, to administer 9H per month where strong doses were necessary. We have very often pointed out that, following these applications, there is an abundant and rich pigmentation which does not seem to be produced in the same degree except in the treatment of gynæcological affections. The comparative trials which we have made with thick filters do not indicate that any better results can be obtained by the method of ultra-filtration. Finally, in applying the technic to this condition, and making the twelfth transverse process the landmark, there will be no difficulty. Doubtless not only the supra-renal capsule is irradiated. Unless ectopic, the kidney will receive strongly a part of the radiations. Now it is the result of our observations that the kidney partially irradiated is not subjected by this fact to any damage. In fact, we have taken care to have had analyses made of the urine before and after each treatment, and they have never shown any trace of albuminuria consecutive to the treatment; one of our patients, who showed a slight albuminuria, the action of the x-rays upon the suprarenal did not in the least modify the quantity of the albumin.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

Roentgenized Spleen Extract. Journal A. M. A., January 4, 1913.

Von Stockum has been studying for five years the effect of the Roentgen rays on tissues. He has become convinced that the rays induce some chemical change in sound tissues which results in the formation of a new substance which has a destructive action in turn upon pathologic tissue.

The conclusion followed that this substance might be produced artificially in the tissues and be used in the treatment of cancer and tuberculosis. If his hypothesis is correct, then injection of the tissues subjected to the action of the Roentgen rays would have a destructive action upon pathological processes. When small animals succumb to the action of the Roentgen rays, the morbid changes found, predominate in the skin, blood and spleen. The spleen is the one organ that seems to escape cancer most often. Experiments with beef spleens gave negative results, but remarkable results were observed when scraps of spleen tissue were implanted in the subcutaneous tissue, and the region of the implants then exposed to the x-ray.

In April, 1910, he treated a man, aged twenty-six, in this way, with multiple suppurating glandular tuberculosis, another man with ulcerative tuberculosis of the entire large intestine, and another man of twenty-one years, with hip joint disease and pulmonary tuberculosis. The results were a surprisingly prompt and permanent subsidence of all the symptoms, but in some other patients the progress of the more advanced tuberculosis was only temporarily arrested. The implanting of the spleen tissue is a disagreeable procedure, and he has been experimenting with an extract of splenic tissue that has been previously exposed to Roentgen rays, and thinks this method has a future. His experience with 3,000 injections has confirmed the harmlessness of such injections or method, while a marked turn for the better was apparent from the first, especially in cases of surgical tuberculosis.

Action of Roentgen Rays on Uterine Cancer. Bumm reports a case which shows that the Roentgen rays can be applied through the vagina to an inoperable cancer, without injuring the vaginal mucosa; inducing such sclerososis in the surrounding connective tissue and muscles that the cancer did not spread further. After the sloughing off of masses of cancerous tissue, a clean cavity was left, and there was no more sloughing or hemorrhage. At this stage the case was oper-

able and therefore the diseased tissue was successfully removed. Although the clinical course was so striking, yet the microscope revealed that the cancer cells proper had not been killed by the exposures, no specific influence on them being apparent, their growth having been checked merely by the barrier that had been thrown up around them by the hardening of the soft parts. The exposure was given every day or so for two months, a total of 800 units or 1600 Kienbock x units.

Von Stockum's experiments are of enough interest to require more than a mere brief abstract. They may mean a great deal more than a first glance would indicate. The raying of the spleen and then the transplantation of the tissues near or around the area affected and being treated is of interest but is bungling and would have to accomplish wonders indeed to become popular. The spleen extract is more in accord with the trend of modern thought and may accomplish something worth while. Whether it will prove more valuable than the Morton's florescence will be determined by experiment. If the effect is sought upon the blood by raying healthy tissues, why not get the effect by applying to the healthy tissues of your patient in the neighborhood of his disease, thus giving an autogenous something in the blood instead of an extra-ogenous unknown. The doctor says he has good results in 3,000 treatments or more and has had success. Could he not get the same results without the splenic extracts. More should be forthcoming on this subject in the future from Dr. Stockum, and it is hoped that he can give us some more definite results, as the subject is of much interest and possibly may contain great possibilities.

J. D. G.

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

The Actions of Light on Tissues. Bering's research has demonstrated that the chemically active light rays have a direct influence on the oxidation ferments, especially on peroxidase in tissues maintained in permanent life *in vitro*. The rays seemed also to promote the cleavage of the chemical building-stones of the body cells. This action of light rays on cleavage and oxidation—the main factors in the intermediate metabolism of the cells—explains a certain number of phenomena observed in daily life and in the clinic, as he relates in detail, especially the deposits of pigment and the sensitization of the tissues.

Sunlight in the Tropics... From an editorial in the *Journal A. M. A.* An abstract from one of the last contributions to science from the late PROF. PAUL C. FUER, Director of the Bureau of Science of the Philippine Islands.

Tropical sunlight has been charged with especially detrimental effects as if it were different from sunlight in other parts of the world. The light which reaches the surface of the earth is composed of ultra violet rays, the rays of the visible spectrum, and the infra-red rays associated with the heat phenomena. To the short rays of the ultra violet portions harmful effects have especially been charged in addition to the damage attributable to the heat factors. Ultra violet rays, are, however, easily guarded against by the use of white clothing; heat rays are not.

Aron showed that when monkeys which are naturally at home in the tropics and might be expected to withstand the effects of sunlight, are exposed to the full sun without protection or artificial means of lowering the temperature, they speedily die, exhibiting a steady rise in temperature. If, however, care is taken to conduct away the excessive heat increment by means of a brisk current of air from a fan, the body temperature remains approximately normal and the animals remain healthy. Under these conditions heat alone is conducted away. If the untoward effect of sunlight in such fatal cases as described above were to be attributed to the adoption of the ultra violet rays their influence should likewise become apparent even when a blast of air is present.

In man, the possibility of heat regulation by evaporation is much more complete than in experimental animals, in which the sweat-glands are not so highly developed, and this adaptable mechanism for heat regulation enables human beings to lower their temperature and protect themselves from such fatal effects as are observed in monkeys. It has been of obvious interest to ascertain the bearing of racial characteristics and changes produced by acclimatization on the ability of different individuals to withstand sunlight well. The relative advantages of dark skinned races over those with lighter colored skins has been variously debated. There are several conflicting factors involved. The dark skin of the negro will absorb heat more readily than the lighter ones of the white races, but the darker colors also have a greater radiating power. Accordingly the heat rapidly taken on the sunny side of the dark-skinned will also be lost rapidly on the shaded side. The darker skins also appear to contain a larger percentage of sweat glands. A further advantage consists in the lessening of injury from the sun's rays in the form of sunburn, an effect which is pronounced on the nerve endings and peripheral blood vessels in white persons.

The pigmentations of the darker skins offset the flushing of the skin, and thus afford a protection which makes up for its more ready absorption of heat. If after weighing these various counterbalancing features it is concluded that the darker skinned races may be somewhat better prepared to withstand the sun, the white man can obtain adequate protection at all times by shade.

Fuer's last opinion is. "Given ample shade, any race is adapted to resist the sun alone of tropical climates; the white man should be better able to do so than the colored. It would seem to me as if the dark skin of the negro was the result of excessive isolation, for it is certain that in a state of nature the negro would seek the shade, intuitively, and in the earliest times he probably was exclusively a forest dweller. The color of his skin would, therefore, more probably be protective just as protective coloring is developed in animals other than man."

The writer of this editorial loses sight of an important difference in the effects of light upon the dark-skinned and light-skinned races. He does not recognize the fact that depression is due to the overstimulating effect of white light which penetrates light-skinned races, but does not invade the deep tissues of the dark-skinned races. There are, then, two reasons why dark-skinned races better withstand the effects of the tropical sunlight: (1) the greater activity of the sweat-glands, providing a cooling of the surfaces of the latent heat of evaporation, and (2) the fact that the heat is not transmitted beneath the skin.

The wearing of dark underclothing by white-skinned races largely obviates this depressing effect, and is made use of by those awake to this fact.—[EDITOR.]

Effect of Ultra Violet Rays on Amoeba—Use of These Radiations in Sterilization of Water.—W. P. Chamberlain and E. B. Vetter, M.D., U. S. Army.—The authors of experiments taken as a whole, demonstrate that, in a water supply the amoebas, whether motile or encysted, may be killed by a comparatively short exposure to ultra violet rays. Ballantidia also appear to be destroyed by the same agency. These facts afford a very potent argument in favor of the use of these radiations in the practical sterilization of water in the tropics.

Roentgen Rays and Radium in Gynecology.—To aid him in preparing a paper on this subject for the International Medical Congress at London next August, Dr. Foveau de Commelles, 26 Rue de Chateaudun, Paris, France, appeals to all confreres to send to him as soon as possible their observations in detail on this important question.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M.D.

Bacteriology of Swimming Pools. By H. F. J. Porter. (*The Survey*, July 27, 1912.)

Porter is another one who has been making recent investigations concerning the infections of bathing pools, having been led to study the subject because of an epidemic of skin disease and pink eye, which seemed to have their origin in these pools.

He quotes Atkins, of the department of bacteriology, Chicago University, who tells of five epidemics following bathing in rivers or in pools filled from rivers where sewage contamination exists. He also reports that five pools whose water-supply was supposed to be clean were the source of cases of eye, ear, throat, intestinal and venereal diseases, including one epidemic of vulvovaginitis which spread among 236 girls using a swimming-pool. Porter says that, as ordinarily conducted, swimming-pools are little better than cesspools, and clear themselves of bacteria largely on the septic tank principle. Investigations of public pools at Hamburg, and at Purdue, Brown, Chicago and Yale Universities, as well as of New York public swimming-pools, show that the impurities are bacterial and chemical. Tests made of Hamburg pools showed fifty-seven microbes per cubic centimeter in water fresh from the tap. After seventy-four persons had bathed in the water it contained 1,800 bacteria per cubic centimeter; after 494 persons, 64,400; after 829 persons had bathed, only 154,000 microbes were found, which illustrates the septic tank principle, or the fact that the microorganisms had reached the maximum which the water could sustain. At Purdue University the water showed 930 microbes per cubic centimeter; after thirty swimmers, previously bathed with a soap shower, had entered the pool, the number increased to 109,200. Another pool first showed thirty-five bacteria, increased after bathing to 190,000 and then to 630,000. In this instance also, bathing was required before entering the pool. The condition of public bathing-pools which are largely used and infrequently emptied and cleaned may be imagined, and these pools are undoubtedly the source of much contagion. The hypochlorite method and the method by the electrolysis of salt have been used for purification in some of the New York pools and at Brown, Purdue and Yale universities, and these methods have been found to sterilize the water to the extent of at least 99 per cent. of the bacteria.

Hygiene of Swimming Pools. By N. P. Ravenel. (*Journal American Medical Association*, October 19, 1912.)

There have been recently a number of articles published upon the question of the care of swimming pools in educational institutions and athletic clubs. Ravenel has made his investigations in the gymnasium of the University of Wisconsin, studying the pools used by men and women. He undertook to investigate how often it was necessary to replenish the quantity of water and also studied the question as to whether hydrochlorite of lime controlled bacterial conditions. The men's pool was 80 x 20, from four to ten feet in depth, and had a capacity of 97,000 gallons. The tank is emptied, cleaned and filled once each week, and the water, in the winter, warmed and maintained at an average temperature of 70. The tank is used daily by about 275 men, which is greatly increased on Saturdays. The bathers are required to take a cleansing shower bath before entering the pool. The swimming pool of the women is 60 x 20 feet, and from 3½ to 7 feet deep, with a capacity of 70,000 gallons. The water used in this pool is filtered through coke and scrap iron before entering the pool, which is emptied Friday, the tank allowed to air until Monday, when it is refilled, and bathing begins Monday afternoon. The water is kept at a temperature from 75 to 80° F., and about fifty persons use the tank per day, and everyone is required to take a cleansing shower bath before entering the pool. Lake Mendota, from which the water is gotten, is rich in lower plant life, and during the summer the water often acquires a disagreeable smell on account of the growth of this vegetable organism. Quite a number of bacteriologic and chemical analyses were made, a study of which can be summed up about as follows: The results show that the number of bacteria gradually increases, the maximum being reached about the middle of the week, followed by a decrease until Saturday, when a considerable increase is again apparent, probably due to the large number of bathers using the tank on Saturday. The colon bacilli is usually present and the chlorine compound was slight. Chemical analysis showed a small, but gradual increase of free ammonia, albuminoid ammonia, nitrites in total nitrogen. Laboratory experiments upon the action of hypochloride of lime in purifying the water in the swimming tank were undertaken, care being observed to use control tests of the water that entered the tank. A determination was made of the amount of available chlorine per million, which would produce practically sterile water. 250 cc. of water from the swimming pool were treated with hypochloride of lime, in the proportion of 0.5 and one part of available chlorine per million for thirty minutes with the latter

figure, one part of available chlorine per million, the water became practically sterile and all traces of the colon bacillus disappeared. We quote: "These tables show that to obtain satisfactory results, the hypochlorite of lime must be had in sufficient quantities to give one part of available chlorine per million. They show further that when the tank is being used, the effect lasts only about three days, after which there is considerable increase in the number of bacteria present. To obtain satisfactory results under the conditions as they exist at Wisconsin, hypochlorite of lime in the proportion mentioned must be added to the swimming pool twice each week. . . . It must be admitted that contagious diseases can be spread by means of artificial swimming pools, and that if the water contains germs of typhoid fever they can be taken into the system. With ordinary waters and with a pool of good capacity, the change once a week keeps the water in fairly good condition. The addition of hypochlorite of lime is a simple, cheap and safe procedure which insures absolute safety."

(C. P.)

DIETETICS AND ORTHOPEDICS.

EDITED BY FRANK E. PECKHAM, M.D., PROVIDENCE, R. I.

Under Medical Miscellany. The Australian Medical Gazette. June 29, 1912.

Mention was made of a pure food investigation by Dr. Carlo Formenti, of Milan, regarding poisonous metals in food supplies. Attention was called to the following facts, that lemonade and other acid drinks, and even carbonated waters often contain lead, that copper was found in nearly all canned green vegetables, and much manganese was found in certain vinegars due to the fact that potassium permanganate is used to correct the taste of cheap vinegar made from refuse and rotting fruit. Arsenic in wines sometimes comes from insecticides used on vines. Formenti recommends the use of aluminum cooking and containing vessels as quite harmless.

Reproduction of a Circular Regarding Milk Substitutes for Use in Intestinal Diseases. By AUGUST SEIBERT, M.D. The Medical World, October, 1912.

"First day: Rectal enema with three pints of lukewarm water, two grms. calomel, wait one hour, then one-half pint of cold filtered water, acidulated by fifteen to twenty drops of hydrochloric acid every three hours.

"Second day: Ten tablespoonsful pearl barley washed with warm water, then strained and placed over the fire in two quarts of water, stirred every ten minutes, and boiled one and one-half hours. Then strain and one teaspoonful of salt and the same of butter.

"Ten tablespoonsful of whole oats are soaked over-night in cold water and then treated same as the barley. Of these gruels (kept in sterilized earthen pots on ice) one-half pint is heated and given every three hours after adding fifteen drops of diluted hydrochloric acid.

"Third day: Ten tablespoonsful of whole dried peas are soaked over-night, in cold water, then washed and strained and placed over the fire in two quarts of water and boiled slowly for two hours, after two ounces of bacon have been added. A pinch of pepper added after straining the soup. Fifteen ounces of this soup given three times, alternating with one-half pint of the gruels given on the second day. Sixteen drops of diluted hydrochloric acid in one-half ounce of water before each feeding.

Second Period: Fourth, fifth and sixth days: Two large ripe tomatoes are peeled and cut up, or their equivalent in canned tomatoes is taken, boiled soft in one pint of water, thirty minutes; strained, added to one quart of bouillon, made with two quarts of water and one pound of beef, lamb, or chicken, cut up fine, boiled for two hours, and strained. Then four heaping tablespoonfuls of rice boiled separately in one pint of water thirty minutes and added to the tomato bouillon. Add one teaspoonful of salt and a pinch of pepper. Bouillon prepared as above, add ten heaping tablespoonsful of rice, whole oats, or pearl barley, boil for another hour and strain. Add salt, pepper and yolk of fresh egg. One-half pint of each is offered every three hours alternately.

"Third Period: Seventh, eighth, and ninth, and tenth days: Two dry rolls cut up and boiled slowly for ninety minutes then strained, leaving one quart of fluid; add one teaspoonful of salt and yolk of fresh egg. One dessertspoonful of wheat flour, mixed with one teaspoonful of butter over a fire and gradually added to the bread soup. Three medium-sized potatoes are peeled, cut up fine, and boiled with any of the above soups for two hours.

"Ten tablespoonsful of lentils are cleaned with warm water, strained and boiled for two hours in three pints of water with two ounces of bacon. This strained and mixed with one dessertspoonful of flour and one teaspoonful of butter as above. Of these, one-half pint every three hours from six a.m. to nine p.m. A small zwieback or a soda cracker is given with each feeding. Hydrochloric acid is given before or with each feeding. Only five feedings in twenty-four hours. Milk in any shape prohibited."

Observations Relating to Diet in Tuberculosis. By W. B. KENDALL, M. D. *The Canadian Medical Association Journal.*

In addition to out of door living, the dietetic management of a tuberculosis patient is of paramount importance. In former times, and by many now, forced feeding was considered essential. The author's experience has convinced him that this principle is fallacious.

A blacksmith does his daily work on a diet of P. 176 grms., Fat, 71 grms., C. 666 grms., a total value of 4117 calories. Is it reasonable to expect a patient with diseased tissues and leading a sedentary life to cope with such excessive amounts? Starving tissues are fed, not by the food ingested, but by the amount of nutrient material absorbed by the gastric and intestinal mucous membranes. An organism half starved should be fed generously, but not burdened, and a gain in weight only a little above normal is desired.

Many physicians increase the quantity of food and especially in the form of protein. Professor Chittenden has demonstrated that healthy individuals take too much protein and this amount ought not to be exceeded in tuberculous patients, because protein forms one-sixth of the total food value and requires much expenditure of energy in its digestion. If too much protein is ingested, intestinal putrefaction occurs and toxins are formed.

Most tuberculous patients eat large amounts and consider that milk and eggs are almost a specific diet.

Quantity and quality of food are important but the regulation of eating is important. Rest before and after meals to be insisted upon. Food should be eaten slowly, thus reducing the quantity.

At the author's hospital, the Muskoka Free Hospital, twenty-five minutes are required in partaking of a meal. In early cases, tuberculous patients with good digestive function, a free flesh diet might be all right, but in advanced cases, such a procedure is not advisable. A well balanced and varied diet with food of the best quality is the rule.

Exclude fads, permit no lunches between meals, no alcohol, eggs cooked and at meals only, and give milk alone sparingly. A weekly arrangement of meals of the Muskoka Free Hospital is appended.

TRANSLATIONS.

BY DR. EDEN V. DELPHY.

Electrotherapy of Exophthalmic Goitre. By Dr. M. Chartier.
(*Archives d'Electricité Médicale*, April 25, 1912.)

The author reviews the work of others in this line of research, and experimentation; refers to the good results obtained by various and contradictory lines of treatment; to the different theories of the origin and causes of Basedow's disease, and sums up as follows: The preferred local treatment of exophthalmic goitre is galvanism or galvano-faradism of the thyroid body, the latter when by a vaso-constrictor action it is desired to obtain a reduction in the size of the enlarged thyroid. Effluviation of the region of the sympathetic tract and the precordia when the phenomena are those of cerebral anaemia or manifestations of cardio-aortic dolours. That a very voluminous goitre indicates the desirability of faradism of the vascular pedicles of the thyroid body. Faradism of the precordial region and galvanism of the pneumogastric is advisable in cases complicated with cardiac hypertrophy. A large field should be reserved for general treatment according to the state of the arterial tension, and varying it accordingly; according to the neuropathic phenomena, and according to the intensity of the organic combustions. For these sinusoidal baths are preferred, reserving for auto-condensation or auto-conduction for the cases where the arterial tension is very much too high. This study indicates that the electrical treatment of that polymorphism of symptoms and diversity of origins which the majority of authors prefer to denominate as exophthalmic goitre, to be rational and definite, should still be inspired by the new ideas acquired of the pathology of the disease and the physio-pathology of the symptoms, and at the same time by the recent data of electro-physiology.

NEW APPARATUS. .

A NEW DEPARTURE IN X-RAY TUBES.

It has been found that the addition of a metal point, placed in the proper position on the anode of an x-ray tube, has the effect to increase the penetration of the tube in a given vacuum and produces finer detail on skigraphic plates; furthermore, there is less heating around the cathode neck.

It has been shown conclusively that in a great many tubes the cathode stream fluctuates when the tube is in action, and this is probably what causes "slitting of the anode," and it is well known that this slitting results disastrously in many cases. At any rate, the tube is generally useless for fine picture work.

When the metal point is attached to the anode, the mark shows the point of focus as either round or oval in shape, and the fusing is confined to one small area only. Operators who have used these tubes claim to have put as high as one hundred and fifty milliamperes through them without fusing the tungsten disc in any way.

These tubes are manufactured by E. Machlett & Son, 153 East 84th Street.

The Journal of **Advanced Therapeutics**

MARCH, 1913.

APRIL, 1913

No. 4

Edited by DR. WILLIAM BENHAM SNOW

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HOT FULGURATION SPARK—A BETTER MEANS OF TREATING ENLARGED TONSILS THAN TONSILECTOMY.

Those who are familiar with the treatment of enlarged tonsils by the hot fulguration spark would never subject a patient to the dangers of tonsilectomy with removal for the relief of the condition. The method is a very simple one, requiring a special electrode for making applications in the mouth.

The application is made with a short contact in each of the crypts of the gland successively and over the surface, producing a slightly seared appearance of the exterior. These applications should be made every five to seven days. Following the application, the gland will become swollen, which will gradually subside. The treatment, if administered following the application of a 10 per cent. solution of cocaine, will cause very little discomfort to the patient.

The facility with which this treatment is accomplished, and the permanent relief derived from it, together with the closure of the crypts, thereby closing the channels of infection, are in every way satisfactory. It only requires a knowledge of the technique and a willingness to take more time for the treatment of these cases, for the method to supplant the use of the tonsillotome.

DRY HOT AIR IN THE TREATMENT OF LOCAL SEPTICAEMIA.

The death of another eminent surgeon from septicaemia, the result of a trifling injury to one finger during an opera-

tion upon a case of infection, marks another failure of surgeons to recognize the local employment of dry hot air, which uniformly averts the fatal termination when systematically employed. In this case, the anti-streptococcic serum was employed with a view to counteracting the infection, but failed, as it does in a large percentage of these cases, marking again the danger of relying upon a measure so uncertain.

A case of indurated acne in a prominent pathologist and teacher, which was treated by the modern anti-streptococcic methods, employing the serum above referred to in maximum doses, was unavailing. He also used opsonines, made from cultures of the infected field without improvement. The x-ray was successful in this case, as it always is in that affection, when employed with the proper technique. A few isolated pustules, however, remained to be treated by hyperemia, as produced by the high-frequency current and radiant light and heat. The failure from serum treatment in the hands of skilled operators, who employ it in the most approved manner, indicates that other means are required for the successful treatment of local septic infection.

Hyperemia, as induced by the local application of dry heat for the treatment of septicaemia in a leg or arm, is a specific in the hands of those who understand the technique of employing it.

The technique is simple: the part should be wrapped in Turkish towelling in such a manner that every part of the skin will come in contact with the wrapping, lest the perspiration which will otherwise collect may boil and blister the surface. Employ temperatures ranging from 350° to 450° F., with the part supported in a modern dry hot air apparatus for thirty minutes. It is possible thus to produce a hyperemia not only of the skin, but also to the deeper structures, resulting in the destruction of the germs, either by the extreme degree of heat employed or by the combined effects of heat and the increased number of phagocytes present with the hyperemia in the infected part.

The virulent types of local septic infection as present in the limbs have been treated by this method, with uniform success when properly administered. The method is so simple, and the apparatus so inexpensive, that it is deplorable that the medical profession are not generally alert to its possibili-

ties. It may be truly said that it is impossible to conceive a case of local septic infection in the parts included that will not respond to this plan of treatment. The only conditions which could preclude the possibility of success would be a low leucocytosis, which would lead to a failure to respond in the normal manner to the presence of infection which might only be present in low types of physical conditions.

OBITUARY NOTICE.

It is with feelings of profound sorrow that the editor announces the death of his friend and one-time passenger mate—Dr. Robert Shuter Macrum—following an operation for chronic appendicitis. He died at Sewickley, Pa., on March 4, 1913.

Dr. Macrum was respected by all who knew him for his genial nature, general worth and scientific attainments. He was a member of the American Electro-Therapeutic Association, the Pennsylvania State Medical Association and the American Medical Association.

STANDING COMMITTEES OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION APPOINTED BY THE PRESIDENT FOR THE YEAR 1912-1913.

The following standing committees have been appointed by the President of the American Electro-Therapeutic Association and announced by the Secretary for the coming year:

Standing Committees.

On Direct Continuous Current, Including Electrolysis, Electro-Chemical Surgery, Ionization and all Apparatus Connected Therewith.—Dr. G. Betton Massey, Chairman, Professional Building, Philadelphia, Pa.; Dr. J. Curtis Webb, Dr. Rosa D. Wiss, Dr. Samuel G. Harris, and Dr. A. P. Merrill.

Induced Current, Including Alternating and High Frequency Currents and Apparatus.—Dr. Frederic de Kraft, Chairman, 148 West 70th Street, New York City; Dr. Frederick M. Law.

Static Currents and Apparatus.—Dr. Fred H. Morse, 462 Boylston Street, Boston, Chairman; Dr. Francis B. Bishop, Dr. Frederic de Kraft.

Photo-Therapy and Apparatus.—Dr. Herbert F. Pitcher,

Haverhill, Mass., Chairman; Dr. William Benham Snow, Dr. Chas. R. Dickson.

Radiography, Radio-Therapy and Apparatus.—Dr. G. E. Pfahler, Chairman, 1321 Spruce Street, Philadelphia; Dr. G. C. Johnston, Dr. Frederick M. Law.

Mechanical Vibration, Therapy, Exercise Therapy and Apparatus.—Dr. Mary Arnold Snow, 329 West 57th Street, New York, Chairman; Dr. A. B. Hirsh, Dr. Byron S. Price.

Hydro-Therapy, Thermo-Therapy and Apparatus.—Dr. Byron S. Price, 65 Central Park West, New York, Chairman; Dr. Curran Pope, Dr. J. C. Walton.

Dietetics.—Dr. Frank E. Peckham, Providence, R. I., Chairman; Dr. Byron S. Price, Dr. A. B. Hirsh.

Standard Therapeutic Measures.—Dr. Wm. Benham Snow, Chairman, 329 West 57th Street, New York City; Dr. Frederic de Kraft, Dr. H. F. Pitcher, Dr. J. W. Travell, Dr. Edward C. Titus, Dr. Byron S. Price, Mr. M. S. Clawson, E.E.

Committee on Research.—Dr. F. Howard Humphris, London, Chairman (*ex officio*), Dr. G. Betton Massey, Dr. Frederic de Kraft, Dr. Herbert F. Pitcher, Dr. G. E. Pfahler, Dr. Fred H. Morse, Dr. Byron S. Price, Dr. Wm. Benham Snow, Dr. Mary Arnold Snow, Dr. Frank E. Peckham.

On Radium.—Dr. J. Curtis Webb, 24 Bina Gardens, London, Eng., Chairman.

On Arrangements.—Dr. Frederick M. Law, 576 Fifth Avenue, New York, Chairman; Dr. Frederic de Kraft, Dr. A. J. Quimby.

On Arrangements for International Congress (Paris, 1913).—Drs. Wm. D. McFee, Wm. Benham Snow, and John J. Grace.

The Executive Council, at a recent meeting, appointed Tuesday, Wednesday, and Thursday, the 2nd, 3rd, and 4th of September, as the date of the next meeting to be held in New York City, at a place to be subsequently announced.

FURTHER INFORMATION CONCERNING THE
DOUBLE SPARK GAP STATIC CURRENT
OF ELECTRICITY.*

BY FRANCIS B. BISHOP, M.D., WASHINGTON, D. C.

The interest manifested in the double spark gap or bipolar application of the static current of electricity has brought me many letters of inquiry from physicians throughout this country and Canada. Most of the questions were of such a nature as to render it quite difficult to answer each person individually, in fact it is quite difficult to answer some questions at all. They were as follows: How is the extra spark gap introduced into the circuit? What is the mode of general application of the double spark gap? What are its physiologic and therapeutic actions? What are the chemical changes, if any, that are supposed to take place in the tissues under the influence of this current? These questions are simple enough and I must admit are very pertinent, at the same time, some of them are very hard, at least for me to answer. I doubt if our knowledge of electro-physiology, electro-biology, electro-therapeutics and physiological chemistry has yet reached that stage of perfection that will enable us to say that we can answer *all* of these questions with the degree of certainty that our answers will be correct.

The construction of the double spark gap circuit and the modes of its general application, I will endeavor to explain by the aid of this diagram: This shows the patient in a sitting position in a Morris chair which in this case is resting upon a platform. The platform is unnecessary for the working of this current. I believe that the oscillatory character of the current is more marked when the chair is resting upon the floor.

I will begin with the positive prime conductor which is marked O; the rheophore marked No. 1, as shown in cut, is connected to O and passes to No. 2, which is a lead foil electrode and covers the upper three lumbar vertebrae. No. 3 shows the spark gap between the sliding rods of the machine, No. 4, shows the negative prime conductor, No. 5, is an ordinary ball electrode (furnished with every static ma-

* Read on September 4, 1912, before the fourteenth annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

chine). No. 6, is an x-ray stand and clamp, and holds No. 5, in position near No. 4. The space between Nos. 4 and 5 forms the extra spark gap, which is marked No. 7. No. 8 in the illustration shows the rheophore connected to No. 5 and passing to No. 9, a lead foil electrode on the abdomen of the patient. When the machine is in motion the current strength is regulated by increasing or diminishing the distance between 4 and 5 and between the sliding rods. The

distance may be so adjusted as to give a preponderance of discharge at the positive or at the negative side, or so as to give a perfectly adjusted to-and-fro current, that is, it discharges first on one side and then on the other.

This, I think, disposes of two of the questions, viz: The construction of the double spark gap and its mode of general application. The application may be made to any part, or any two or more parts of the body with a concentration or distribution of current at either pole. We have in fact a bi-polar static disruptive discharge a little accentuated perhaps in consequence of the extra gap. Now as to what the physiological properties of this current are, or as to what

changes, chemic or otherwise that take place under its influence, *I do not know*, nor do I think that any one can say truthfully today that *he knows* the physiological properties of the static current. We know some of the physical effects and no doubt some of the therapeutic results of the various modes of applications, but the physiological properties of the static current has never received the same careful study as has the continuous current and one thing is very certain and that is in the study of the physiological action of the static current we must leave out of the question any electrolytic action upon the tissues. We must consider strictly the question of stimulation and the action of the protoplasmic cell and the organized masses of protoplasmic cells under the influence of stimulation.

We have been taught that all living matter is made up of colloids and crystalloids, we have been taught the action of protoplasm under the influence of stimulation, we have been taught the action of colloids in the presence of and under the influence of the crystalloids, especially those crystalloids that are classified as electrolytes. With this knowledge which has in a measure been obtained by experiments with gells and electrolytes, we are assured that many of the reactions that have taken place in vitro are carried on in the living body. These facts obtained from careful and laborious research in physical chemistry together with the little knowledge of electro-physiology that we have gained by experiments upon plants and the lower animals and our clinical experience may give us some idea of the physical and physiological changes that may take place in the tissues of the body under the influence of the bi-polar static current and hence some idea as to what we may expect when we apply it to disease.

Pauli in his splendid little work on physical chemistry says: "Experiment has taught us that there exists physiological effects which are attributable solely to ions. The vital property of the ions to keep in solution the widely distributed globulins cannot be replaced by any other kind of dissolved crystalloids. Differences in the concentration of ions brought about through differences in their migration velocities constitute the source of difference in electrical potential. Loeb was probably the first who recognized in such concen-

tration chains the cause of the majority of electrical phenomena observed in animal organs.

In the living animal we have to deal with complex mixtures of crystalloids and colloids between which there exists relations so varied that they are in part still incapable of investigation. Connected with the uninterrupted vital activity of the cell, the anabolism and catabolism of its substance is the conversion of crystalloids into colloids, and colloids into crystalloids, and this at present still entirely unexplained transformation serves at one time to protect a substance from oxidation, as in the conversion of sugar into the colloids glycogen, while at another it protects the protoplasm against the poison of its own products." In addition to the ionic action of the electrolytes of the body certain colloids hold also their charges of positive or negative electricity and they act and react upon each other. There is much evidence to prove that in the nucleated cell, the nucleus and its surrounding protoplasm are oppositely charged electrically. So it would seem that the vital activity of the cell is due to the activity of its positive and negative ions, that the metabolism of the body is carried on by electric currents in the cells and that a nervous impulse of any kind is purely electrical. These currents are the result of chemic changes that are constantly taking place between acid and alkline media of the salts and bases in solution and between the crystalloids and colloids as well as between the oppositely charged colloids. When a static current is passed through a liquid electrolyte either as a direct current or as a disruptive discharge (so long as the electrolyte is not sparked) the resistance is so slight that the current produces *no appreciable* chemical change in the electrolyte. With the colloids of the body, which are positively or negatively charged we are told that they are attracted by opposite polarities and under all forms of stimulation the protoplasmic cell will change its form, so it seems to be at least within the bounds of reason to suppose that the action of static electricity upon the living tissue is due directly to the irritability of the protoplasm and the stimulating effect of the current upon the protoplasmic cells, and not so much to its ionic effects, as protoplasm does not conduct the electric current as the crystalloids do and as the colloids generally are very poorly supplied with ions. Hence the great resist-

ing power of the protoplasm and consequently the heating effect of the static current when applied to the body.

The known influence of stimuli upon the protoplasmic cell would lead us to suppose that mild currents of static electricity steadily applied for a certain period would produce a tonic effect, would increase, not so much the activity of the cell as its working capacity. In the change of form brought about in the cell, surface tension and osmosis should be stimulated together with assimilation and dissimulation, these are associated with constant chemical changes in the cell substance, and as absorption and secretion take place in certain directions (as Pauli aptly remarks) these peculiarities can scarcely be interpreted otherwise than as an expression of polarity. Therefore, as the expression of polar action is so well marked and demonstrated throughout all the tissues of the body both fluid and solid, one will naturally suppose that the interchangeable polar activity of the static current is well adapted to modify the normal changes already going on in the tissues. And according to its mode of application, its intensity of action, the length of time of application, we may expect a modification of local or general pathologic conditions, especially in those conditions where the normal ionic interchange of the tissues have been disturbed, suspended or inhibited by some extraneous substance or from poisons of their own products, even when the organs of the body have undergone pathologic changes, the conditions may sometimes be modified and the patient's life made more comfortable by observing the character of the current and certain physiologic and chemic laws as associated with regional anatomy and the action of one form of tissue upon another, and the action of the bi-polar static current upon them all. This, however, must be made the subject of a special paper in which I hope to publish a series of cases treated, when I will go more fully into the subject of electro-physiology and bring out more fully the practical application of the laws of physical chemistry than I have been able to do in this.

In conclusion I wish to state that all the claims that I make for the extra spark gap current in therapeutics, when unsupported by physical and physiological facts and by therapeutic results, I want to see them fall and be eliminated, that they may give place to sound scientific facts that will stand the

test of time. Of one thing I am certain, and that is, that the use of powerful currents of electricity that have been so frequently advocated, is against reason and very often will do harm instead of good.

When we understand the reaction of the normal tissue under the varying degrees of stimulation, including the stimulus of disease and pain, and when we know the modifying influence of the various currents of electricity upon these reactions, then will we begin to fully appreciate the wonderful natural agent at our disposal for the relief of suffering humanity.

Gentlemen: I have tried to the best of my ability to answer the most of your questions and to give you my reasons for these answers. Whether the double spark gap current or the reasons that I have given for using it will stand scientific scrutiny or the test of time and experience, I do not know. They are in your hands and I am sure that they will receive charitable but close investigation and criticism.

Discussion.

Dr. Henry E. Waite, of New York. The connection shown gives the most powerful localized static current. You cause a tremendous contraction painlessly by running the machine slowly. Run the machine fast and adjust a short spark gap and you will get a most beautiful smooth current. Dr. Bishop had made it a little different from those previously constructed. McIntosh made one years ago with a rubber piece and two sliding balls. I made one in a cylinder of rubber with an insulation and a screw to move it backward and forward. What Dr. Bishop has done is to arrange and control his parallel spark gap the same as we use in controlling x-ray tubes. The actual use of it is old, but it has not been used generally, and was forgotten. It gives a painless and powerful contraction.

Dr. William Benham Snow, of New York. I am glad to hear Dr. Bishop emphasize the fact that in his judgment there was no electrolytic action from the static current. There are certain things, however, in the action of the current he has described that are readily demonstrable. If you have a swollen indurated tissue and the current softens it and reduces it so that the blood circulates again where it did not circulate,

it is demonstrated that you have relieved a condition interfering with metabolism. As there is no electrolytic action, the effects are only mechanical, and the possibility of any harmful effect except from exercise fatigue is eliminated. The findings in the urine and the increase in nutrition are clinical evidence of actual physiological effects upon metabolism. The other effects of the static current are, from a physical point of view, demonstrated to be mechanical. We should study the action on the tissues from the effects produced and not from the empiric theories of electricity *per se*. When we demonstrate that the high frequency current induces hyperemia and does not produce electrolysis, it is evident that with the hyperemia there is increase of metabolism, increased nutrition, and increase in the number of phagocytes in a localized field. You can call it a physical effect or a physiological effect. When we undertake to study exactly what any electric current does to the cell, we have a difficult proposition except from a clinical standpoint. If that is ever accomplished with an alternating current it will be when we can measure it with an electroscope—an impossibility. The static current is used in the main for its mechanical effects upon the tissues to effect drainage, and elimination, and to promote metabolism. It is not wise to confound other things which we cannot know with the things we can demonstrate when the effects are beneficial and not harmful. I am much interested in the principle of employing electricity for clinical results, in a way that actually accomplishes things, regardless of the technical points that we can discuss, but can never know by demonstration. There are thermic currents, mechanical currents, and an electrolytic current. We have them in the d'Arsonval and the static and the constant current, and should use each selectively for the peculiar effects to which it is best adapted and to meet the respective indications as they arise.

Dr. Frederic C. Tice, of Roanoke, Va. Following the suggestion that Dr. Bishop made in a previous paper, I last summer attached my x-ray spark gaps to the sliding rods of the prime conductors of the static machine thus getting either double or triple spark gaps in that way. The results were more than I had anticipated. There was a general improve-

ment, a tonic effect, a strengthening of the heart, and improvement in digestion. I think it a very valuable method.

Dr. Henry W. Frauenthal, of New York. This is not directly pertinent to the paper, but I would like to have some man at the next meeting bring an analysis of urine before treating a patient with the static machine and three hours afterwards. Then we would get some idea of the effects of these currents on the muscular and nerve tissue.

Dr. Snow. There was a report showing the effects on the urine two years ago by Dr. Cannon.

Dr. Gibson. My friend Snow has not referred to something as demonstrating the usefulness of the static machine. I have frequently made examinations of urine before and after treating in rheumatic cases, and have found that the urine is always heavier loaded after static treatment. Even thirty minutes after you are through with the static treatment you will find that there has been a decided rise in the contents of the urine.

Dr. Bishop. I did not mean to bring out the ignorance of other people in speaking of our lack of knowledge of the physiological properties of this current so much as to expose my own. I have been using the static current about twenty-five years. I admit I do not know much about it. Dr. Snow seems to have the physiological properties of the static current confounded with the therapeutic properties. If he applies it to a mass and softens it up, that is a therapeutic property, that is a local application, but what do we know about the action of the static currents upon the healthy tissue? If we want to know all about a thing we must start with the condition of health. If we know the action upon healthy tissues, then we can very easily learn its action upon unhealthy tissues, provided, of course, that we know the pathology. I suggest that we all get our clinical experience. But what do we know about it when we get it. Can we duplicate it every time. We ought to be able to duplicate it under all conditions. If we know the physiological properties of the current itself and we know the pathology, then our therapeutics ought to be a very easy matter.

Dr. Snow. I want to ask if the mechanical effect is not physiological.

Dr. Bishop. Most assuredly. Stimulation of all tissues,

from any source—vibration, massage, electricity, light, or anything else—resolves itself into body electrical currents, because you cannot stimulate the tissues of the body without producing currents in those tissues, and they have their physiological and pathological effects. We ought to know this. We have spent too much time studying the varying degrees of currents, the different characters of apparatus and many other things.

I would like to relate a little clinical experience I had with this current. There was an old lady seventy years of age sent to me by a doctor in Washington, Dr. Dye. This lady had been ill for a number of months. She managed a big manufacturing establishment. For a number of months she had not been able to attend to her business. She had pains all through the abdomen, but she was sent to me to be relieved of a numbness of the extremities. I made my examination as carefully as I could, and in making an analysis of the urine I came across a reaction that I did not understand. I knew that she had been taking iodid of potassium or something. I asked the doctor if he had been giving her any medicine. He said iodid of potassium. He says, "You know what is the matter with her, don't you?" I says, "No, I am trying to find out." He says, "She has a tumor of the pancreas." She had a hemorrhagic tumor of the pancreas. Going upon the principle that I have stated, that the current follows the course of the nerve currents, I placed her upon a metal covered platform on a chair, made an application over the five upper dorsal vertebrae, another application to the feet, and I attached the negative pole to the platform and the positive pole to the back, and gave her that treatment with a half inch spark gap. In a week's time the numbness had disappeared from the extremities. She said she would like me to treat this condition in the abdomen. Then I applied the pad over the abdomen. That woman steadily improved, so much so that she was able in a short time to resume her business. She has been to New York and Baltimore several times, and she discontinued her treatment because she said it was a farce to come up there feeling as well as she did. I do not for a moment report that as a cured case. She is not cured, and in all probability never will be.

HIGH FREQUENCY ELECTRICITY IN THE TREATMENT OF EXOPHTHALMIC GOITER AND PERVERTED THYROID SECRETION.*

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Before taking up the subject matter of the paper to be presented, it is deemed advisable by the writer to review, in a measure, the subject of so-called hyper and hypothyroidism: and our resume must begin with a criticism of the use of the terms hyperthyroidism and hypothyroidism. These are the terms usually employed to describe those pathologic conditions that are dependent on or caused by perversion of thyroid function, when the symptoms are not grave enough to warrant the use of the term exophthalmic goiter. Our present knowledge of the subject is so limited that I think we would be much more nearly correct were we to use the term "perverted thyroid secretion." The keenest observer and closest student of these conditions is often in doubt as to whether a certain group of symptoms is due to over or under secretion, symptoms of both conditions of perverted secretion being often present in the same patient, at the same time. I therefore propose the discarding of these inexact terms and would suggest the use of the term "Perverted thyroid secretion" until a better term shall take its place.

There are many who refuse or fail to recognize the condition of perverted thyroid secretion unless the three "cardinal symptoms," goiter, tachycardia and exophthalmos are present, just as years ago "consumption" was not diagnosed unless the patient was greatly emaciated, had a severe cough and had night-sweats. To-day, the recent graduate who does not recognize tuberculosis in its incipient stage is considered incompetent; and the day is not far distant when the early symptoms of perverted thyroid secretion will be recognized as readily, and treated as early in the disease, as is now the case with tuberculosis. And this will be especially true when it is more generally known that we have a means of relieving the symptoms, of checking the pathologic growth of the gland, and of reducing an already enlarged gland to almost normal size, and to a condition of normal secretion.

* Read at the twenty-second annual meeting of the American Electro-Therapeutic Association, at Richmond, Va., September 4, 1912.

The symptoms of perverted thyroid secretion, in addition to the so-called "cardinal symptoms," are legion, some being due to over-secretion, some to under-secretion, others to perversion of secretion, and still others to those conditions resulting from defective metabolism. To analyze these symptoms is a difficult matter and I approach the task with a great deal of hesitancy, and ask the indulgence of my hearers, because only by so analyzing the symptoms can I adequately and satisfactorily explain the results of the means of treatment that I have been employing.

The symptoms that I ascribe as directly due to the toxaemia are as follows, viz: tachycardia and subjective palpitation; exophthalmos; emaciation or obesity; trophic disturbances, such as flushing of the skin, dryness of the skin, excessive perspiration, etc; indigestion and all gastro-intestinal disturbances; irregularity of menstruation and many of the nervous manifestations; also marked tenderness over the fifth to sixth cervical vertebra and over the fifth to seventh lumbar vertebra.

The symptoms that have been referred to as resulting from defective metabolism are: Some of the nervous manifestations; obesity or emaciation; muscular weakness; diarrhoea; constipation; colitis and enteroptosis. The symptoms herein mentioned are by no means all that have been accredited to the condition of perverted thyroid secretion but practically all others are dependent on one or more of those mentioned.

In the opinion of the writer, *all* the symptoms of perverted thyroid secretion—exophthalmic goiter, hypothyroidism, hyperthyroidism—excepting those due to the mechanical pressure of an enlarged gland, are due, directly or indirectly, to a toxaemia of the sympathetic nervous system. The physiologist tells us that the sympathetic nervous system controls the secretory epithelium and the unstriated muscular fibres. A resume of the above mentioned symptoms will show conclusively that all are due, either to lack of control of the unstriated muscular fibres, or to deficient or defective glandular secretion.

Exophthalmos is due to a dilatation of the vessels of the orbit from a relaxation of these vessels, due to a lessening, or a loss, of sympathetic nerve control of the unstriated muscular fibres of these vessels.

Tachycardia and palpitation—a difference in degree only—are caused by lack of sympathetic nerve control and possibly also by direct thyroid toxaemia. The middle cervical ganglion, located opposite the sixth cervical vertebra, has branches which ascend to the thyroid gland and others which join the cardiac plexus, proving a direct sympathetic nerve connection between the thyroid and the heart, and accounting for the tachycardia and palpitation in conditions of perverted thyroid secretion. The writer's attention was first called to this possible relation between the thyroid and the heart by noting in a number of cases of perverted thyroid secretion a marked tenderness just over the location of the middle cervical ganglion—the nape of the neck—and reasoning that the tenderness was due to the action of the toxins on the ganglion, and thereby affecting the heart action, he treated over this area. The result of this treatment was that the cardiac symptoms were relieved within a week in a large proportion of the cases; and this was especially noteworthy because of the fact that several of the cases had been under treatment for varying lengths of time before this observation had been made and treatment directly over the thyroid gland had had no effect on the tachycardia. After a few treatments over the region of the middle cervical ganglion the cardiac symptoms improved.

In the gastro-intestinal symptoms we have the index for all the symptoms of defective metabolism. The sympathetic nerve, controlling as it does the secretory epithelium, is, in conditions of perverted thyroid secretion, unable to properly control the secretions of those glands that provide the fluids for the digestion of the foods ingested. Digestion and proper absorption, under these conditions, cannot take place. In the opinion of the writer, either emaciation or obesity is the result of failure of digestion and absorption, according to the nature of the defective digestion or the idiosyncrasy of the individual or both. Some of the intestinal symptoms are due directly to this perverted secretion of the digestive glands and others are due to the presence of the poorly or partially digested food masses. These symptoms also have been markedly benefited by treatment over the relative portions of the sympathetic nerve system, as evidenced by improved digestion, a gain or loss of weight as the case might be, and by more normal defecation.

The trophic disturbances—flushing of the skin, excessive perspiration, dryness of the skin, etc.—are due directly to the toxæmia of the sympathetic; and although slower to respond to treatment, are finally markedly influenced. The same is true of the irregular and sometimes painful menstruation and the nervous manifestations, although all of these respond more quickly.

The marked tenderness over the 5th and 6th cervical vertebra is explained by the location of the middle cervical ganglion. I have been unable to satisfactorily explain the presence of tenderness over the 5th to 7th dorsal vertebra; but the ganglion there located is connected with the middle cervical ganglion and is probably affected thereby.

Of the nervous manifestations, many are due to that ever-present factor in faulty metabolism, from whatever cause, insufficient nerve nutrition.

Diarrhoea, if present, may be due to the presence in the intestines of masses of faultily digested food; and if constipation is present, the same reason holds good, with the additional factor, that where the secretions of the digestive fluids is below par, the same is true of those substances that favor and bring about peristalsis.

Colitis, if present, is due to the same causes.

Enteroptosis I have found present in every case examined. This is reasonably explained as a secondary condition in those cases where there is any emaciation, due to the loss of substance and tone of those structures that are designed to hold the abdominal organs in place.

To recapitulate, I would say, that all the symptoms herein mentioned as due to perverted thyroid secretion, are due, either directly or indirectly, to a toxæmia of the sympathetic nervous system, caused by the probably selective action of the thyroid toxine on the sympathetic nerve.

In addition to the aforementioned anatomic and physiologic factors, my deductions are based on the results of treatment of these conditions. During the past eighteen months I have treated twenty-four cases of perverted thyroid secretion. These have varied in severity from the cases having one or two symptoms referable to the perverted thyroid secretion—in addition to the enlarged gland—to those that presented *all* the symptoms of exophthalmic goiter.

The history of one of the latter cases is particularly interesting. This patient states that she has always had a "lump in her throat." Three months before she was referred to me she noticed that the lump was getting larger and continued to increase in size; she became very nervous; had decided and annoying palpitation even when lying down, and tired upon the slightest exertion; she also had dyspnoea, difficulty in swallowing and a hacking cough. The thyroid gland I found greatly enlarged, with marked pulsation; extreme exophthalmos; pulse 170 to 180; perspiration very profuse. Her weight at this time (May 28, 1912) was 103 pounds.

Under high frequency electrical treatment the gland has decreased markedly in size, pulsations have become much weaker, exophthalmos not as marked as at the beginning of treatment; the pulse is 96 and regular, all the symptoms of nervousness are better; she does not perspire as profusely, does not tire as before and has no dyspnoea or cough; and has gained eleven pounds in weight. In this extreme case, which has been under treatment for ten weeks, we may not get a perfect cure as regards the enlarged gland (the reduction of which is now very marked), but the improvement of all the symptoms has been so marked that it is surely worth our while to continue treatment for a reasonable length of time.

The other cases of exophthalmic goiter that I have treated are markedly improved; but none of them has been under treatment long enough to form the basis of a report.

Inasmuch as ten weeks is the longest time that any case of exophthalmic goiter has been under my care since I have been using high frequency electricity in this condition, I am unable to draw any definite conclusions as to the ultimate results. If, however, we *have* reached the limits of improvement in this particular class of cases—and this I am not ready to admit—and the cosmetic effects are to be seriously considered and an operation performed, a patient with a pulse of 96 instead of 180; with no dyspnoea or pressure symptoms; with no nervous manifestations and with none of the trophic disturbances is in a much better and safer condition for operation than before this treatment was instituted.

In one case only did treatment prove altogether disappointing. In this instance the gland was enlarged, the right lobe

being considerably larger than the left; the patient was very nervous and easily excited; had palpitation, irregular menstruation and had lost 18 pounds in a year, weighing at this time 103 pounds. Noting no improvement after twenty treatments, I conferred with her physician and we decided that this was a case for the surgeon. In January of this year the right lobe of the gland was removed. The enlargement proved to be due to an adeno-cystoma of the right lobe, the left lobe being normal. In July, six months after operation, I saw this patient; from her statement she is still very nervous, has occasional palpitation, and her weight is the same as when I first saw her.

A single case proves nothing; but the thought naturally arises, that both the high frequency treatment and the operation having failed of their purpose, the cause of this train of symptoms must arise from some other source.

In those cases where the enlargement of the thyroid gland, with symptoms of perverted thyroid secretion, is associated with abnormal conditions of the generative organs, such as lacerations of the cervix or a damaged pelvic floor, the results of treatment are satisfactory, but the improvement is not permanent. There is no doubt that there is some direct connection between the generative organs and the thyroid gland, probably through the sympathetic nerve system. In these cases, treatment has had the desired result, but under the stimulus from the injured uterus or the surrounding parts the thyroid again enlarges and the same train of symptoms is again produced in from four to eight weeks. These cases should be referred to the surgeon, for operation on the uterus and the damaged pelvic floor. If, after operation, the symptoms persist, a short course of treatment will in all probability permanently relieve them, the exciting cause having been removed.

The cases with which I have had the greatest experience are those where there is enlargement of the gland with decided symptoms, but with little or no exophthalmos. With cases of this class we are able to draw definite conclusions. The results of treatment have been all that could be desired. The symptoms gradually lessen in severity and finally disappear; and the enlarged gland is reduced to normal size, or so nearly normal that it is just palpable and no longer a disfigurement.

The first evident result of treatment is a general feeling of "betterment" with a lessening of the nervous symptoms; this improvement continues, the attacks of palpitation become less frequent and less marked, headaches disappear, the gastro-intestinal symptoms improve and menstruation becomes more regular and less painful. In a number of cases, where in the first history the patient had said that there were no symptoms excepting the enlargement, I have been informed by the same patient after a few weeks' treatment that her headaches were so much better, or that she was less nervous or that menstruation had become more regular. It was not that the patient deliberately wanted to deceive but the symptom had become so a part of the individual that until it was relieved it had been taken for granted as a natural condition.

There is another class of cases, so closely allied to those of perverted thyroid secretion in their symptomatology and the results of treatment that a report of one condition would not be complete without reference to the other.

These cases present themselves with a history that is identical with one of perverted thyroid secretion, but with no evidence of enlargement of the thyroid gland, past or present. Headache, nervousness, palpitation, repeated and severe attacks of indigestion, dryness of the skin or excessive perspiration, loss in weight or obesity, diarrhoea or constipation, muscular weakness, colitis and enteroptosis are some of the symptoms and conditions found. But in none of these cases have I found the marked tenderness over the 5th to 6th cervical vertebra, although I have noted the tenderness at the 5th to 7th dorsal vertebra. In most of these cases the history is that a severe attack of indigestion or ptomaine poisoning or some extreme gastro-intestinal condition preceded this train of symptoms and that thereafter the conditions had become chronic, some of them having persisted for over five years. If the thyroid toxine, acting upon the sympathetic nerve can produce the train of symptoms that accompanies cases of perverted thyroid secretion, cannot another toxine produce similar symptoms through *its* effect on the sympathetic nerve? I believe that it can and does. The study of the chemistry and bacteriology of the intestinal tract, in spite of all that has been done along these lines, is still in its infancy. The toxines that are there elaborated are an un-

known quantity. In the opinion of the writer the symptoms in these latter cases are due to a toxæmia of the sympathetic nerve system, from a toxine or toxines elaborated within the intestinal tract under conditions favorable for their formation. For example after an attack of ptomaine poisoning the toxines are no longer elaborated but their effects upon the sympathetic nerve system has been such that it is no longer able to perform its functions in a normal manner. The result is that the secretions are not normal and the unstriated muscular fibres not controlled as in health. By means of the high frequency current we are able to produce an hyperaemia along the spinal column, through which the sympathetic is stimulated and its function restored. The result in these cases has been surprising; all the symptoms are rapidly improved—much more quickly than when caused by perverted thyroid secretion—and the gain or loss of weight, as the case may be, is rapid and permanent.

In conclusion: I would suggest the use of the term “perverted thyroid secretion” to describe all conditions of enlargement of the thyroid gland accompanied by any symptoms; excepting the well marked cases of exophthalmic goiter.

I would urge a more careful examination of *all* cases, with the object of detecting any enlargement of the thyroid gland and accompanying symptoms; or any toxic effect upon the sympathetic nerve system.

The conclusion seems inevitable: that all the symptoms of perverted thyroid secretion are due to the effect of the thyroid toxine on the sympathetic nervous system; and that treatment with high frequency electricity gives us better and more permanent results than any other method of treatment, excepting where a resort to surgery is necessary.

In all cases of exophthalmic goiter where an operation is to be performed the patient should have, as a preliminary to operation, a course of high frequency treatment, to the end that the distressing symptoms may be lessened, if not altogether relieved, and securing for the patient the best condition possible for surgical procedure.

Discussion.

Dr. G. E. Pfahler, of Philadelphia. I would like to ask Dr. Lewi some questions, how often he treats each patient; what is his guide as to treatment; the strength of current and how

he is guided thereby, and how long these treatments continue?

Dr. Lewi. In the first place, in extreme cases of exophthalmic goiter I have been treating the patients in the beginning as often as every day over a period long enough to produce an intense hyperemia throughout the length of the spinal column as far up as possible, and also produce some hyperemia over the enlarged gland. Patients under this treatment are much less tolerant of electricity in the neck than in the back.

As to current strength, it may be my ignorance of certain facts, but I have never yet been able to find a way of expressing the strength of the Oudin current except as to its effect. I have seen a spark of two inches that gave a current that would not give a good hyperemia in an hour. I have it now so that with a spark gap of less than half an inch I can get up a heat in half a minute so that you will want to drop the electrode. I do not believe there is any instrument made to measure it. The length of the effleuve from the handle is sometimes long and thin, sometimes short and fat. The only way of judging that I have is with my hand. I test the electrode in the palm of my hand. The length of treatment is only dependent upon the length of time necessary to get the hyperemia. In beginning treatment on a case it takes much longer to get the desired hyperemia than it does after three or four treatments. The guide also is this same hyperemia. When the hyperemia is intense we discontinue. When a patient with perverted thyroid secretion presents herself I tell her in the beginning that she must not expect any considerable betterment in her condition for three or four weeks. I have yet to see a case that has not been benefited after half a dozen treatments. The length of the course of treatment varies as does the length of a course in any condition that we know of. One little girl was so nervous that she wanted to jump out the window. She was in a terrifically hysterical nervous condition. There was absolutely no apparent cause for it. In looking her over I found a slight enlargement of the thyroid gland. She came for three days, and her nervousness was gone. Other cases have taken as much as five months when there have been no symptoms.

Dr. Louis von Cotzhausen, of Philadelphia. I have been especially pleased by the reference to Dr. Abrams. I have treated exophthalmic goitre with radiant heat and light and the high frequency current, but I find lately, although my experience with it since attending the lectures has been very small, that apparently I get much quicker results in following Abrams' teachings. Dr. Lewi said that he produces a hyperemia over the vertebrae. I am not criticising the statements or methods of the doctor; I entirely agree with him; but I would suggest that he study up the individual spinal

segments where we get the best results, and then limit his treatment in at least to three or four cases successively experimentally to those regions, and see whether he does not get quicker results. I think, if he would make a comparative study of the cases treated in the one way and of cases treated in the other way, it would be an exceedingly interesting subject for a second paper.

Dr. Rosa D. Wiss, of Meridian, Miss. I have been very much interested in this paper, however. I have had very little experience in this work—only one case—but I was successful with that one case. It was a girl about nineteen years old. She had been troubled for about two years with excessive nervousness. She was unable to do anything or go to school. They noticed this enlargement in her throat. They brought her to me to see if I could do anything with electricity for the lump in her throat. I thought that there was some pelvic disturbance, and found decided trouble, and treated her for that trouble. At the same time, I gave her the high frequency treatment almost exactly as the doctor gave it. I gave her also a great deal of sinusoidal treatment. I never saw anyone improve more rapidly than she did. She got over her nervousness in a few weeks. I was treating the case three months, I think, when the glandular enlargement disappeared, and she is now all right.

Dr. Jefferson D. Gibson, of Denver. I have seen it in one or two cases that came to me for pulmonary tuberculosis. They seemed to be extreme cases, with dyspnoea, etc. I had a very distressing case a short time ago, a bronchocele. Sometimes you find these cases following a goitre, the bronchocele pushing the heart and lung out of position, and they are about the most distressing conditions you can come in contact with. The patient is nervous, the pulse is bad, and the condition is usually quite fatal.

Dr. Arthur W. Yale, of Philadelphia. I would like to suggest the use of the vibrator in those cases in which there have been no fibrinous changes in the gland. I have treated quite a few with nothing but vibration. When fibrinous changes are present my quickest results have been obtained by using the x-ray in frequent prolonged treatments followed with the vibrator.

By this means the gland has gone down very quickly and the symptoms seem to disappear after two or three weeks. Vibration over the gland and following the line of the lymphatics that drain the entire cervical region, and also over the cervical vertebra interspaces.

Dr. Arnold Snow, of New York. I wish to thank Dr. Lewi for his interesting paper, and the manner in which he called attention to the subject.

In the first place, I was very much interested in the fact

that he treated the spine, that is, he devoted most of his treatment to the spine, not that I think that all troubles can be treated through the spine, but a great many of them can be affected through the nerve supply by indirectly affecting the blood supply.

In regard to the condition that has caused the goitre, it seems to me that the cause is either inflammatory or else something that causes a toxemia, which may be either perverted secretion or some other toxic waste that is within the body. Whether it is of the sympathetics or through the sympathetics, the blood supply of the part is a question that I think will bear much thought and reflection. For the nerves that supply the blood vessels pass by way of the superior laryngeals or through the depressor with the plexus of the sympathetic and the vagus. It seems to me that that is why the doctor has gotten the results, *i. e.*, he has thus indirectly affected the vagus and thereby relieved the tachycardia indirectly.

In regard to the connection with menstruation, all of my patients have had menstrual disturbances, and I was interested to read from one of the German journals that in one case the patient who was afflicted with goitre was also afflicted with a fibroid tumor. When the surgeon had removed the fibroid tumor a cure of the goitre resulted. In these cases the size of the goitre increases at the time of the menstrual periods, and the symptoms are more aggravated.

The indications are, of course, to remove the existing cause, to prevent its formation, and to get rid of the resulting deformity. The doctor's mention of sensitiveness over the seventh dorsal vertebra was of interest, in that in treatment of the spine we find often in the vicinity of the seventh and eighth painful conditions where there is stomach trouble, and it seems to me that possibly—of course, I simply theorize as to this—that the reason for that sensitiveness, in the case Dr. Lewi described, is owing to the vagus connection through the nerve supply to the stomach.

Our method of treatment has been to use the x-ray in order to diminish secretion, for, as we all know, the ray will diminish secretion. So in those cases where the goitre has been of a fibrous character we have used the ray with the anode about fourteen inches away and one milliamperere of current passing through the tube for ten minutes every other day. That was done to affect to diminish the secretion directly. We use the wave current afterwards for twenty minutes with an electrode about four inches long and about two inches wide: just long enough not to cause contraction of the sterno-cleido-mastoid much during the treatment. We employ a slowly discharging spark at the spark-gap, so as to get the mechanical effect on the tissue. The tachycardia I

have relieved by vibration on the abdomen, simply abdominal vibration. Those who have done massage work long ago demonstrated that massage of the abdomen would lessen the pulse rate, and vibration does the same. I have had cases in which the pulse rate has been lowered from 124 to 72 following a series of treatments.

The question of blood pressure in these cases is also one that interests me greatly. I have not noted the blood pressure in many cases, but of late where I have noted the blood pressure I have found that those cases that show a condition of myocardial insufficiency are relieved by vibration between the seventh cervical and the first dorsal vertebrae. We reach the vagus in that way. We vibrate usually from three to five minutes, using not very much pressure, not so heavy as Dr. Abrams uses when he concusses, but we get the same result. If we use vibration we should make interruptions now and then, in order that if the vibrator has much of a frictional movement it will not rub or chafe the skin. This offers a great field for study.

In regard to the presence of toxemia. A condition was called to my notice lately in which I had been treating another member of her family for whom I had recommended the use of the Metchnikoff bacillary tablets, and she recommended it to the one who had the goitre. This was not under my own directions, but might be of interest to those who are interested in the subject of goitre. The patient with goitre used the tablets and the gland diminished in size.

Dr. Lewi. In regard to Dr. von Cotzhausen's remarks about the relation between this and spondylotherapy, I have treated over the spinal areas when I have deemed it necessary for the sake of affecting the sympathetic nerves that control those areas, but with a simple enlargement of the gland, with few or no symptoms, I have treated directly over the gland. I have treated over the spine where there have been symptoms, and over the gland alone where there have been no symptoms, and had results.

In enlargement of the gland with conditions of the uterus that need repair, I believe that they should be treated and will relieve the symptoms. I think the sympathetic nervous system has been greatly neglected as a cause of symptoms, and I think the more we study it the better we will relieve symptoms.

REPORT OF THE COMMITTEE ON X-RAY AND HIGH FREQUENCY TUBE AND ACCESSORIES.

FREDERICK M. LAW, M.D., NEW YORK, CHAIRMAN.

In this report your committee desires to call attention only to the points of interest in connection with x-ray tubes constructed and used in a practical manner during the past two years, believing that this is not an opportune time to describe the technicalities of illuminating tubes or the theories involved in their operation.

X-ray tubes, as now used, consist essentially of a glass bulb in which are sealed four terminals. The best tubes made in this country consist of a bulb of specially annealed glass of uniform thickness and without any flaws or impurities as it has been found that very slight irregularities or defects are liable to cause destruction of the tube in use which might endanger the patient or operator, owing to the high tension of the vacuum.

The size of these bulbs may vary from 4½ to 8 inches in diameter but the diameter of 7 inches is now becoming the generally accepted standard as this size gives the best balance in the working conditions as to stability of vacuum and heat radiation. The walls of the bulb should be as thin as possible considering the external pressure. The bulbs almost universally employed in the construction of these tubes are imported.

The importance of the quality of the glass is well illustrated in the Lindeman focus tube. The glass in this tube is composed of lithium, beryllium and boron with atomic weights of 7, 9 and 11, respectively instead of sodium, calcium and silicon with atomic weights of 23, 40 and 28 as used in the construction of the ordinary tube. The Lindeman glass absorbs only one-fifth the amount of x-rays absorbed by ordinary glass, heats very slightly, does not fluoresce and produces few secondary radiations. This glass will shorten radiographic exposures and also allow more of the therapeutic soft rays to reach the part undergoing treatment. Rays are generated so soft they will not penetrate ordinary glass, and are stopped by aluminium 0.2 mm. thick.

One type of tube consists of lead glass with a sodium glass window. An example of this type is the Piffard tube which

consists of a small bulb with auxiliary bulb to add volume to the vacuum, this was devised for therapeutic purposes, and is still used by a few operators.

The terminals of the cathode and anode of an x-ray tube must be sufficiently removed from the bulb and supported by glass tubes or stems inserted in the bulb to obviate any danger of a spark jumping to the globe or around it.

The cathode must be of generous size and placed not too near the glass of the neck and accurately centered as considerable heat is generated at this point and might fuse or crack the glass. The cathode should be made of aluminum of uniform concavity, having a smooth face and placed in proper relation to the cathode stem.

The degree of concavity of the face of the cathode determines the size of the pencil of the cathode stream and consequently the size of the focal point on the anode or target.

The anode or anticathode should be made of a heavy metal of high atomic weight backed by a metal of high heat conductivity. At present this combination usually weighs from four to six ounces.

Of the various metals which have been employed as facings for the target platinum and tungsten are now most used. At present a popular form consists of a platinum face $1/2000$ of an inch in thickness backed by a plate of silver $3/32$ inch in thickness which in turn is backed by a heavy mass of copper. This combination is chosen on account of the high atomic weight of platinum, 193.3, and the specially high heat conductivity of the silver which has been shown to resist the heat developed by the impact of the cathode stream better than a greater thickness of platinum alone. Another form much in vogue consists of a heavy mass of copper in the face of which a disk of tungsten is inserted. As the General Electric Co., maintains a monopoly in the production of this metal they have recently limited the construction of those terminals to one form which consists of a cylindrical mass of copper weighing about six ounces, in which is imbedded a disk or button of tungsten $11/16$ inch in diameter and $3/32$ inch thick. Tungsten has an atomic weight of 182.6 so that in a tube of equal vacuum it gives off rays of less volume and penetration than platinum, but as its fusing point is 3,000 and that of platinum 1,775, it may be used in tubes of higher

vacuum and with currents of larger volume, thus producing available rays of higher penetration.

In regard to the angle which the face of the target forms with the axis of the cathode it has been found that for use in connection with the lead glass bowls and diaphragms commonly employed 45 degrees is the most suitable, though Rollins and Williams have expressed a preference for the angle of 56 degrees for theoretical reasons.

The focus of the tube must be small to get the best detail in radiography and this can be very readily determined by means of the wire screen test, originated by Dr. Pfahler. A small section of wire screen with the mesh measuring about $\frac{1}{2}$ -inch square is placed on a support 8 inches above the plate, the tube 24 inches above the plate and focused on the center of the screen and an exposure made. If the cathode is ground true and the focus point not over 1-16 inch in diameter the image of the screen is clear cut, there is no distortion of the wires and they appear in almost their true size. If the focus is broad or the cathode face is irregular the wires are distorted, are larger than natural size and the whole plate appears foggy. If the cathode is not ground true, there may be a thickening of the vertical or horizontal lines. Astigmatism of the cathode as it were.

After a tube has been in use some time the small particles of air remaining are bound or occluded by the metal parts and the metallic deposits in the glass, the vacuum becoming so high as to endanger the tube. Some means must be taken to reduce this high vacuum until current enough can pass to heat the tube and drive off some of the occluded gas.

There are practically three effective types of regulator, the osmosis, the chemical and air valve. The osmosis regulator consists of a small palladium rod sealed into the bulb. The external end closed. On heating with a flame a certain amount of gas is taken from the flame and percolates through the tube into the bulb. This is the most durable but least satisfactory as regulation cannot be done while the tube is operating and regulation is uncertain because gas is absorbed while the palladium is cooling.

The common type of regulator used by American manufacturers is the automatic chemical device. This is a glass

tube connecting with the bulb containing asbestos, which on heating gives off gas. The heating is produced by a current shunted from the cathode. Regulation can be made automatically by means of a movable wire attached to the regulator and approaching the cathode. The space between the end of the wire and the cathode determining the resistance of the tube. When the vacuum becomes too high a spark jumps to the wire, heats the asbestos, drives off a certain amount of gas and lowers the vacuum. This method has the advantage of enabling one to regulate from a distance by connecting a third wire to the regulator and controlling from the switch board or coil.

There are a number of forms of this type, but it is not necessary to describe them here.

Muller, of Hamburg, has produced a regulator to reduce or raise the vacuum, but the latter is not needed as the vacuum can be raised by shifting the negative wire to the anticathode and the positive wire to the cathode passing a mild current through the tube. This causes a certain amount of gas to be occluded and the vacuum is raised to the point desired.

An air valve regulator has been used to some extent on the continent but has not yet met with much favor in this country. This device consists of a capillary tube connecting with the globe and occluded at its outer end by a column of mercury. This column may be raised sufficiently to permit the entrance of a definite quantity of air by means of a bulb or pump. Theoretically this form of regulator should lengthen the life of tubes and if it can be made in a compact form will no doubt become popular.

The fourth terminal or "help" anode consists of a disk of aluminum inserted in the globe near the anode and supported on a short stem. It is a convenience to the manufacturer in constructing the tube and is of no importance in operation.

The method of cooling tubes by a current of water circulating around the anode has not proven satisfactory in radiography as the water is a poor conductor of heat and the danger of puncture while using large amounts of current is too great, but for therapeutic purposes when light currents are employed it is still used by some.

All tubes become discolored with use. This color is produced by a deposit of metal in the wall of the tube. It

occludes a certain amount of gas, thus raising the vacuum, then when the tube becomes heated gives off this gas and reduces the vacuum. When the vacuum is high this deposit acts as a conductor for the current, thus decreasing the quantity of x-rays generated. This deposit can be removed with hydro fluoric acid.

In selecting a tube one must consider whether it is to be used for radiography or treatment. Almost any tube with a medium vacuum will serve for the average treatment. If treatment is to be given for a lesion some distance beneath the surface a hard tube must be used and an aluminum or leather screen interposed between the tube and the patient to absorb the soft rays and prevent undue reaction on the skin.

There is also a lead glass tube with a window in the end of the tube which is placed in contact with the part to be treated. There are cavity treatment tubes with the anode placed in the extremity of a projecting tube, but they are not very satisfactory as yet.

In selecting a tube to be used for radiography the type of generator must be considered. A tube properly pumped for one may not work satisfactorily on another. This is due to the difference in the secondary voltage. It can be made to work by judicious regulation but is not as satisfactory as though it were properly pumped in the first place. A tube that is pumped for a coil will not operate as well on a transformer.

The customary way of estimating the degree of vacuum is by noting the length of the parallel spark gap. This is unreliable if a tube is pumped for one machine and used on another. The length of the gap is determined by the wattage passing through the tube. A tube that will back up a 6-inch gap at 40 m. a. on a generator passing 50,000 volts will back a longer gap at 100,000 volts. The degree of vacuum is the same with either generator, but the amount of x-rays generated is different.

No improvements in vacuum tubes for the application of high frequency currents therapeutically have been noted.

Discussion.

Dr. F. Howard Humphris, of London. I would like to say a word in regard to the Lindeman tube. I have used it for nearly a year now, and it does not shorten the exposure as far as taking pictures is concerned. It may shorten the exposure for superficial skin lesions, because it allows the soft rays to come through. I have one Lindeman tube and another Muller tube that I have used alternately, and I know the exposures are exactly the same for both tubes.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D., LOUISVILLE, KY.

The Therapy of Cold.—This is a subject that is too frequently neglected, and one that should have more careful study on the part of the general practitioner than it has at the present time.

According to Blackader the effect of cold air on the body is two-fold. First, there is an actual extraction of heat which is rarely desirable, and as far as possible should be prevented. The body loses the largest amount of heat through conduction and this should be prevented by proper clothing. Much more important than the abstraction of heat from the body is the stimulating action of the cold on the delicate sentient nerves of the periphery. Both respiration and circulation are strengthened, oxidation is increased, and nutrition becomes more active. There is also a powerful stimulation conveyed to the medullary centers by the effect of cold air on the nasal mucous membrane. Cold, provided it be not excessive, has a markedly stimulating action on the digestive system. Cold also seems to stimulate the blood-forming organs. As a result of these factors, the resisting powers of the body against toxins and its ability to respond protectively to the assault of infection is greatly increased. These benefits of cold depend, however, on the power of the individual to react and this varies greatly and seems to be dependent on the vasomotor tone. Those suffering from any interference with the free passage of air through the nostrils do not react well to cold air. Inflammatory conditions of the larynx and trachea may be subjected to additional irritation by cold air. To benefit from a winter in the north, the intestinal tract and the kidneys should be in good working order. Extreme cold is not desirable for those suffering from gout, arthritis or neuritis. For those suffering from advanced degeneration of any organ, for those advanced in years and for the very young extreme cold may be distinctly harmful. It cannot be too strongly emphasized that all the benefit to be derived from a residence in the north will depend on the completeness with which an outdoor life is lived.

CURRAN POPE.

Care of the Ice Chest.—*Good Health* makes an excellent suggestion to certain housewives who find themselves well stocked, sometimes overstocked with fruits and vegetables. Prompted by the desire to keep everything from spoiling, their

first thought is to cram the motley lot into the ice-chest along with butter, milk, cream and the dozen-and-one little left-overs that the frugal housekeeper utilizes in some appetizing way. What wonder that there are so many smelly, disorderly, positively dirty ice-chests!

If the celery be left loose, broken leaves will fall. Rings of cream and milk tell where dripping bottles have stood. Crumbs of butter dot the shelves. Fruit juices in tippy receptacles leave unsightly stains. Then there is the slime that oozes down from the storage part, clogging up the pipes and causing a bad smell. Too, there is the accumulation of bits of hay or straw or whatever is used in the ice-houses for packing. All these conditions necessitate frequent systematic cleanings.

Once a week is none too often to wash out the ice-chest, using always a clean cloth and clean suds, not the regular dish-cloth and water through which a lot of dirty dishes have been passed. After giving the whole interior a thorough washing, including the part wherein the ice is stored, the pipes and all the racks, rinse again and again with clear water, taking care to flush the pipes until the drip-pan shows not a trace of slime or refuse. Baking soda slightly moistened will remove all stains. One housewife who is classed among those "painfully" particular, yet whose family is known to be in the best of health, always insists on having everything clean before it goes into the ice-chest. She wipes off the butter jar, the cream and milk bottles; washes the eggs, and puts them on a granite pie plate; rinses thoroughly until clean, all the vegetables such as cabbage, radishes, tomatoes, egg plant, cucumbers, etc.; she at once prepares the lettuce and celery for serving, places them in bags made for the purpose and puts them in the ice-chest; all fruit, melons, etc., after a good scrubbing and proper rinsing are then subjected to the cold and thoroughly chilled before being eaten.

The suggestions are most excellent and would oftentimes prevent troubles of digestion that are "seemingly" unaccountable.

CURRAN POPE.

The Physiological Effects of Copious Water-Drinking With Meals. Editorial, *Journal American Medical Association*, November 30, 1912.

We have in this department reviewed from time to time, the various experiments made by P. B. Hawk and his co-workers. The subject matter has been brought up to-day by this editorial, and he states so concisely and clearly the result and present status of Hawk's experiments that we copy same verbatim. "Strangely enough, little work had been done on this subject previously, as the conclusion had been accepted

on theory without experimental evidence that water taken with meals would dilute the digestive juices and hence would retard digestion. Experiments on dogs proved that the ingestion of quantities of water with food caused a marked increase both in the quantity of gastric juice and its hydrochloric acid content. Further, a dog could fast longer with less loss of weight and strength if allowed an abundance of water. This indicates that water promotes economical metabolism.

Hawk then carried out a series of experiments in which healthy young men were put on a uniform diet and their food and excreta analyzed quantitatively. The experiments were divided into three periods: a preliminary period, during which the subjects were brought into a condition of approximate nitrogen equilibrium by several days of uniform diet and light exercise; the experimental period, during which definite quantities of water were added to each meal; and a period during which the effects of the experiment were watched for a number of days with uniform diet without the added amount of water. In some cases 500 c.c. and in other cases 1,000 c.c. of water were taken with each meal in addition to the daily amount of water normally taken. The subjects were weighed daily and analyses made of the excreta collected as twenty-four-hour specimens.

An expected result was the immediate increase in the quantity and decrease in the specific gravity of the urine. Accompanying this was a decided increase in the ammonia-nitrogen and chlorin excretion. Hawk explains this as a result of the increased secretion of hydrochloric acid by the stomach due to the stimulating effect of the water. This acid, being neutralized by the ammonia formed as a result of protein consumption in the tissues gave the increased output of ammonia and chlorin, probably as ammonium chlorid. There was also a decrease in the uric acid content and an increased allantoin output which is tentatively attributed to the more complete oxidation of the waste products. Analyses of the stools showed a decrease in the fecal output both wet and dried. This was accompanied by a decrease in the fats and carbohydrates excreted, in the fecal nitrogen, and in the actual bacterial content. The intestinal putrefaction was decreased as measured by the indican output. This is ascribed to the inhibition of the indol-forming bacteria due to the accelerated absorption of the products of protein digestion. More complete absorption of all foods leaves less culture medium for bacteria, which may explain the decrease in fecal bacterial content. Though the nitrogen of the urine was increased, the fecal nitrogen was decreased and quantitative analysis of the total nitrogen ingested and excreted showed that the body was storing nitrogen. In other

words, the system was laying up protein material. All this would indicate that the digestion, absorption and economical utilization of proteins, fats and carbohydrates had been promoted by ingestion of water with meals.

The amylolytic activity of the feces, denoting, according to Wohlgemuth, the content of pancreatic ferment present, was increased over that period of average water ingestion. Hawk interprets this reservedly as indicating a stimulation of the pancreatic function.

The subjects showed increase in body weight and a general improvement in physical and mental condition. There were many desirable and no undesirable results. The effects were more pronounced when larger quantities of water were taken. The results were not temporary but persisted after the close of the experiment. As suggested previously in these columns,* the copious drinking of water with meals should not be practiced indiscriminately. Certain pathogenic conditions would be a distinct contra-indication to copious water-drinking. Also experiments have established that digestion is retarded until the stomach contents have been brought to the body temperature. Hence large quantities of very cold water would be distinctly non-beneficial. It would be of interest to know whether equally favorable results would follow if the increased amount of water were taken between meals instead of with meals. As the matter stands, the experimental evidence seems to refute the theories previously held regarding the effect of water taken with meals.

DIETETICS AND ORTHOPEDICS.

EDITED BY FRANK E. PECKHAM, M. D., PROVIDENCE, R. I.

Presidential Address on "Arthritis." By Reginald Morton, Archives of the Roentgen Ray, February, 1913. Before the Electro-Therapeutical Section of the Royal Society of Medicine.

In his opening remarks, the author calls attention to the different opinions regarding the etiology, whether due primarily to toxemia or to the influence of the toxin on the nervous system or to the direct action of micro-organisms or its toxins, the pure clinician, still talks about "rheumatism."

Reference is here made to Goldthwait's classification: Infectious arthritis and hypertrophic arthritis. This classification is objected to because the first group is rather too comprehensive in including all forms of arthritis due to micro-organisms and objection is made also to the "acute" and "subacute" varieties of rheumatoid arthritis. Reference is

* Water-Drinking with Meals, editorial, *The Journal A. M. A.*, January 13, 1912, p. 117.

also made to Nathan who differentiates rheumatoid arthritis and osteo-arthritis both clinically and pathologically. The two English writers Garrod and Llewellyn Jones divide arthritis into two main classes, rheumatoid arthritis and osteo-arthritis and this classification is the one which is agreeable to the author who goes on to say that while recognizing that different micro-organisms play their part in the forms of arthritis, yet the constant association of one particular organism with a particular form of arthritis has not been established and it is to the bacteriologist that we must look for assistance.

Schuller's bacillus is the one most frequently found in rheumatoid arthritis. It is found, not usually in the fluid, but in the tissues of the joint. The point in question being whether the toxin is produced locally or at a distance from the joint. Next comes the consideration of the two conditions, rheumatoid arthritis and osteo-arthritis. The author considers them as distinct diseases, noting that one is atrophic, the other hypertrophic, also that rheumatoid arthritis has the manifestation of a constitutional disease. It frequently is typical of a toxæmia, at times acute with fever and sweating and vaso-motor disturbances. Mental worry and anxiety are predisposing influences. The small joints are most frequently attacked, with spindle-shaped swelling. No Heberden's nodes are present.

In osteo-arthritis, the large joints are most frequently attacked. The onset is never acute, there is no pyrexia, sweating or vaso-motor disturbances, no loss of power or muscular wasting. Heberden's nodes are frequently present and constitutional symptoms are absent.

Radiography completes the diagnosis. The author very properly emphasizes the use of the x-ray for early diagnostic purposes and for differentiating the types of the disease. In the treatment of these conditions, the author thinks that vaccine has a value but he has the most faith in ionisation, using a solution of iodide of lithium, also the salicin ion. Pads of a dozen or more thicknesses of lint soaked in a two per cent. solution are best. Each joint or group of small joints should be treated individually. One pole on each side and alternated at each sitting. Large currents are preferable and a one-hour sitting. Sitzings daily, if possible. The use of high frequency currents as ordinarily understood are futile.

Diet in Nervous Disorders. By Tom A. Williams, M.B., C.M., Edin., Washington, D. C. *Pacific Medical Journal.*

The author notes the scarcity of the literature, also the irrationality of forced feeding, even in tuberculosis. He also

states that the idea of nerve starvation has been found only partially correct because intoxication has become a dominant interpretation. In modern city diet, excess of proteids and deficiency of carbohydrates is the rule. An animal fed on carbohydrates alone, emaciates and dies quickly and it is known that a substance of great value to the nervous system is removed in the milling of grains and that this can not be replaced by the addition of flesh.

Calcium is one of the stabilizers of nerve activity. Phosphates are a necessary pabulum of nerve. With these two elements of food removed by milling, a serious deficiency exists.

Diet Against Arterio-Sclerosis and Pressor Excess.

A potent cause of nervous inadequacy is arterial hypertension and diet here is important. Purius and excessive nitrogen seem to lead to the formation of pressor substances. When the renal and hepatic functions are diminished, nervous symptoms increase. Cow's milk commonly given as an adult diet is unwise. Its nitrogen is disproportionate, poor in iron and other mineral elements and it does not demand mastication. As assimilation is the important factor, the enjoyment of the food must be looked after by cooking and serving appetizingly and the surroundings must be cheerful. The rapid circulation and oxidation produced by exercise are the best preparation for assimilation. Some of the food should be of firm consistence so as to demand mastication and stimulation of salivation. Avoid rigid diets. As pathological states only represent an organism's reaction to noxious influences, the optimum diet for good health when in health is only rarely to be departed from.

Outside of arterio-sclerosis the author discusses diet for epileptics, in drug addiction, psychasthenia, hysteria, etc., on the same general principles, and any one interested in these would do well to read the original article.

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

"Herpes," abstracted from chapter on skin diseases from Dr. Francis Howard Humphris' book on "Electro-Therapeutics." The author thinks that in many cases of this disorder a good deal of relief can be obtained. In the early stages he produces as intense a hyperemia as possible. He thinks this

will dilute some of the toxins affecting the nerves, or dissipate some of the microscopic stasis along its course. For this purpose he uses the high-power Leucodescent lamp over the posterior nerves roots, where the hemorrhagic inflammation of the ganglia is destroying the cells. He claims if by the hyperemia induced we can relieve the pressure, some of the degeneration may be arrested. In the later stages the brush discharge applied to the vesicles aids materially in drying them up, and minimizing the risk of their contents becoming purulent.

When healing has taken place, the early application of the glass vacuum tube and vibration massage will help materially in reducing the risk of scars. Even in the most formidable variety, when the herpes corresponds to the entire area supplied by the distribution of the ophthalmic division of the fifth nerve (where the gasserian ganglion is involved and scarring is said always to follow), it may be reduced by careful and persistent treatment to such a minimum as to be barely noticeable. For the obstinate and severe pain which unfortunately accompanies or follows the complaint, he derives great advantage from x-rays, using a tube of medium hardness over the place where the lesion was and over the posterior nerve root corresponding to it. The static wave current and static sparks are valuable means in the relief of these pains and for removing the muscular spasm which often accompanies this condition.

In chronic eczema, accompanied by itching and induration, the author uses the static brush discharge, the high candle-power light, and x-rays. The itching is relieved, and the induration softened from the first few treatments. He says it is difficult to dogmatize as to which of these three remedies will do the best in any particular case, and experience will not always enable one to choose the most appropriate agent. But if the brush discharge does not relieve at the first two or three sittings, then it should be changed to one of the other methods. No one of these three can do any harm in this condition, which is usually much benefited by one more of them.

TRANSLATIONS.

EDITED BY EDEN V. DELPHEY, M.D.

A Bismuth Preparation for Radioscopic Examination of the Stomach. By Dr. G. Rechou. *Archives d'Electricite Medicale*, February 10th, 1913.

In making a stomachic radioscopy, everyone has noticed that in employing the usual mixtures of carbonate of bismuth, syrup of gum arabic, etc., two layers are formed almost

immediately, in the interior of the stomach, an inferior layer composed almost entirely of carbonate of bismuth, which being heavy has deposited very rapidly; and a superior one composed of the liquid vehicle and containing very little of the bismuth. In using "rice milk" instead of the above mixture, with the bismuth carbonate, the same phenomena are produced and complicate very materially the radioscopic examination. Under these conditions the shadow of the base of the stomach which is formed upon the radioscopic screen is perfectly clear and distinct because of the opacity of the deposited carbonate of bismuth; while the body of the stomach, and especially the upper part is but slightly visible, because of lesser radiopacity of the liquid containing very little of the carbonate of bismuth in suspension. Consequently the "notches" in the stomach or the irregularities caused by a cancer or an ulcer will be inappreciable on account of the dimness of the shadows. We have therefore thought that it would be desirable to have a perfectly homogeneous bismuth mixture and one which would not soon precipitate, and moreover one which would be easy to make up. We believe we have attained the desired result in the following formula:

| | |
|--|-----------------------|
| Carbonate of bismuth | 120 grammes |
| Gum arabic | 20 " |
| Gum tragacanth | 5 " |
| Simple syrup | 150 cubic centimeters |
| Water | 350 " " |
| Orange-flower water, enough to flavor. | |

The preparation of this mixture is very simple. The powdered solid substances are intimately mixed in a large mortar and the liquids gradually added with constant trituration. The gums swell rapidly and forms a perfect mixture with the carbonate of bismuth and does not require more than five minutes in its preparation. This makes about 550 cc. of a perfectly fluid mixture which is pleasant to take, and is sufficient for an ordinary stomachic fluoroscopy. We have experimented *in vitro* with this mixture comparing it with the ordinary mixtures commonly employed. Our mixture is perfectly homogeneous at the end of twenty-four hours, and even at the end of forty-eight hours shows not the slightest trace of a deposit and gives a perfectly homogeneous opacity on the fluorescent screen. On the contrary, a mixture made of syrup of acacia shows a considerable precipitate at the end of twenty minutes, and an almost complete deposit of the carbonate of bismuth at the end of twenty-four hours. In giving our mixture to a patient, we have found that it remains perfectly homogeneous in all its parts and shows a perfectly opaque shadow upon the screen. An examination of

the same patient a half hour after its ingestion still shows a stomach perfectly homogeneous in all its parts and without any trace of sediment. We feel therefore that we cannot recommend too highly such a preparation to medical radiologists because of the simplicity of its preparation and the perfect results which it gives for radiosopic examination.

BOOK REVIEWS.

X-RAY DIAGNOSIS AND TREATMENT. A Text-Book for General Practitioners and Students, by W. J. S. Bythell, B. A. Cantab, M.D. Vict., Hon. Physician to the Ancoats Hospital, Manchester (Electrotherapeutic Department); Medical Officer to the X-ray Department of the Manchester Children's Hospital; Medical Officer to the X-ray Department of the Salford Royal Hospital, and A. E. Barclay, M.D. Cantab., M.R.C.S., L.R.C.P. Medical Officer to the Electrical and X-ray Departments Manchester Royal Infirmary; Late Clinical Assistant to the Electrical Department of the London Hospital. Published in London, by Henry Frowde, Oxford University Press, and Hodder & Stoughton, Warwick Square, E. C.

The authors have accomplished what they aimed to in this book. The work does not give a definite technique either for diagnosis or treatment, but illustrates the finding as demonstrated from their personal investigation. In this particular, the work fulfills its purpose. In separate chapters are shown illustrations from injuries of bones and joints with a group of fourteen skigrams illustrating different fractures. Another chapter is devoted to diseases of bones and joints in which the various bone lesions are shown in twenty-six illustrations. In another chapter the examinations of the bones and joints in children there are upwards of twenty illustrations; and so other chapters give results of examinations of the head for detection of foreign bodies; examination of the thorax, abdomen and urinary system. One chapter is devoted to x-ray therapeutics. The final chapter of ten pages gives a general outline of the principles of x-ray technique, but is not designed to give more of the methods of precision required in radiography. A chapter devoted to a study of the abdominal viscera illustrates very well some of the conditions which may be demonstrated by the use of the x-ray.

The work contains 118 plates made from radiograms which are excellent, produced on fine glazed paper and illustrating a variety of conditions diagnosed by the x-ray. The work has fulfilled the object of the writers and is valuable as illustrating the uses of the x-ray in diagnosis and treatment and

will be read by the general reader with interest. It is not a work for the specialist, but is designed for those who are not generally familiar with the subject. It, however, will also be read with interest by experts.

MECHANICAL VIBRATION: ITS PHYSIOLOGICAL APPLICATION IN THERAPEUTICS. By M. L. H. Arnold Snow, M.D., Author of "Mechanical Vibration and Its Therapeutic Application." One-time Professor of Mechanical Vibration Therapy in the New York School of Physical Therapeutics; Associate Editor of the *Journal of Advanced Therapeutics*; Late Assistant in Electrotherapeutics and Diseases of the Nervous System in the New York Post Graduate Medical School, etc. 476 pp. 12 Plates and 58 Illustrations. The Scientific Authors Publishing Co., New York. Price \$3.50.

There are more and sometimes better ways of treating and curing disease than by giving drugs, and the conscientious physician will learn to use that method which will in his opinion restore the patient to health in the shortest time. In order to do so, it is necessary to understand the use of both drugs and physical therapeutics. This book is written by one who for years has been a close and earnest student of the best means of curing disease and doing it in a scientific manner. The author gives a thorough description of vibratory apparatus both portable and stationary and their comparative uses, indicating the methods of application in a clear, concise, and thorough manner. She very comprehensively gives the physiological action of vibration and shows how different parts of the body may be beneficently affected by stimulating the reflexes, and much of this has been the result of her own careful original research. In order to assist the learner there are carefully compiled tables so that one can see at a glance the salient facts in vibratory therapy. This is a book which every practicing physician ought to possess in order that he may either learn how to employ this very useful therapeutic agent, or that appreciating its value he may send the patient to some one who is versed in its employment and who can use it to the best advantage, thereby relieving patients who are incurable by drugs and who otherwise would fall into the hands of quacks and charlatans. Both the author and the profession are to be congratulated; the first because of its excellence and timeliness, and the second because of its usefulness.

E. V. D.

ELECTRO-THERAPEUTICS FOR PRACTITIONERS. Being Essays on Some Useful Forms of Electrical Apparatus, and on Some Diseases which are Amenable to Electrical Treat-

ment. By Francis Howard Humphris, M.D. (Brux.), F.R.C.P. (Edin.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), L.M. (Rot., Dublin), President of the American Electro-Therapeutic Association, Vice-President of the Brussels Medical Graduates' Association, Fellow of the Royal Society, Member of the Roentgen Society. Illustrated. Published, New York, by Longmans, Green & Co.; London, Edward Arnold. 1913.

The author has not attempted in this work to give the reader a text-book on electro-therapy, but he has accomplished what is equally as valuable by giving the readers the results of his personal experience of the use of physical measures. Probably no one is better abreast of the times in the employment of these measures than Doctor Humphris, and the results which he has obtained and outlined in this work are commendable.

The first nine chapters are devoted to uses of static electricity, in which he has outlined the apparatus and the various methods of employing the different modalities. Chapter X. is devoted to incandescent light as a therapeutic agent, and the eleventh chapter to electro-thermic penetration. The remaining fourteen chapters are devoted to therapeutics, and include the employment of these measures in a large variety of conditions, particularly chronic conditions not amenable to other methods of treatment. The glossary of sixteen pages adds to the value of the work. The work is a valuable one to not only the electro-therapeutists, but the medical men who would be informed on the newer methods of treating a large class of diseases which are generally considered incurable. The work is well illustrated, containing fifty-six illustrations.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pædiatrics, Obstetrics, Gynæcology, Orthopædics, Pathology, Dermatology, Ophthalmology, Otology, Rhinology, Laryngology, Hygiene, and other topics of interest to Students and Practitioners. By leading members of the medical profession throughout the world. Edited by Henry W. Cattell, A.M., M.D., Philadelphia, U. S. A., with the collaboration of John A. Witherspoon, M.D., Nashville, Tenn.; Sir William Osler, Oxford; A. McPherson, M.D., Toronto; Frank Billings, M.D., Chicago; Charles H. Mayo, M.D., Rochester; Thomas H. Rotch, M.D., Boston; John G. Clark, M.D., Philadelphia; James J. Walsh, M.D., New York; John Harold, M.D., London; J. W. Ballantyne, M.D., Edinburgh; Richard Kretz, Vienna; with regular correspondents

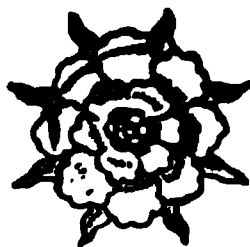
in Montreal, London, Paris, Berlin, Vienna, Leipzig, Brussels and Carlsbad. Vol. I. Twenty-third series. 1913. Philadelphia and London, J. B. Lippincott Company. Price, \$2.00.

This, the first volume for 1913 of *International Clinics*, is instructive as showing progress in nearly every department of medical science. The broad-gauge tone of the publication, which investigates every department of medicine, is most commendable.

The valuable contribution by Dr. Abrams, on the treatment of Aneurysm of the aorta, which might be considered unfavorably by those not conversant with progress in the direction in which he leads, is a striking example of departure from the beaten path of conservatism. In the department of surgery, the chapter on bone grafting by Albee's method, by Dr. Rugh, is instructive as showing the possibilities of the new method of treating **Port's disease**.

Chapters are also contributed on the treatment of poliomyelitis, scarlet fever; others on intestinal auto-intoxication, transplantation of tissues, and one on electro-therapeutics by Dr. Morris Brinkman, in which he has given an outline on the considerations of the selection and rational uses of physical therapeutics in the treatment of disease. This last-named is the first of a series of articles on physical therapeutics to be published in the subsequent numbers of *International Clinics*. The closing chapter by the editor gives an outline of medical progress during **the past year**.

The work is valuable for every physician, covering, as it does, a broad medical field, giving the up-to-date status of the subjects treated. The book has upwards of 300 pages, numerous illustrations, is printed on good paper and well bound.



The Journal of **Advanced Therapeutics**

VOL. XXXI.

MAY, 1913.

No. 5

Edited by DR. WILLIAM BENHAM SNOW

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PHYSICAL TREATMENT OF HEMORRHOIDS.

The treatment of hemorrhoids when properly considered recognizes the indications from the viewpoint of cause. Constipation or obstruction of the portal circulation, one or both, are present in all cases. The management of a case of hemorrhoids without considering the correction of the habit or condition which led up to the affection is negligent.

Obstruction of the portal circulation, associated often with dilatation of the splanchnic vessels, is one of the most common conditions met in general practice. When the function of the liver for destroying poisons and eliminating them from the circulation is recognized—disturbances resulting from overwork arising from the common habits of life of the present day—the effect is readily recognized as the common cause for both constipation and hemorrhoids. Over-indulgence and over-feeding are manifestly the starting point of a vicious circle, which terminates in poisoning and obstruction.

The treatment of hemorrhoids must therefore look first to the correction of the diet and habits of the individual, together with the disengorgement of the congested liver. There is probably no method so effective in relieving such engorgement as the administration of the static wave current, with a plate 5 by 8 inches, placed directly over the liver, employing a spark-gap of from 4 to 10 inches, according to the physical

condition of the patient. This should be administered daily for twenty minutes, when it will, as a rule, be promptly followed by a discharge of bile and increased functional activity of the alimentary canal so stimulated. To treat a case of hemorrhoids without coincidentally removing the liver and intestinal engorgements is attempting to relieve only the local condition.

There are few cases of early hemorrhoids, as well as late cases in which there is not already marked thickening of the walls of the hemorrhoidal veins, that cannot be cured by the joint use of the static wave current, applied over the liver as described, followed or preceded by the static wave current with a proper glass vacuum electrode applied in the anus and rectum, employing both daily until disengorgement is complete, and the hemorrhoids have disappeared. The large majority of cases will be entirely cured by this method. When, however, the hemorrhoids have been present for so long a time that marked changes have taken place in the coats of the veins with thickening and dilatation, local operation may be necessary, either surgical or by one of the following procedures. In any event, the wave current may be first administered with advantage in the manner described.

Some operators successfully remove the hemorrhoids by the application of destructive fulguration or the desiccation method. These methods are painful, but if done thoroughly at the first application are very effective. Another method is to locally anesthetize the parts and then pass a copper needle connected to the positive pole of a constant current battery into the pile, with the indifferent pole placed elsewhere. Pass a current of 5 to 10 mm. until the sack has turned a pea green color, when the hemorrhoid will usually be reduced to one half the original size, and slough away after a few days following the treatment. Another method is the application of the negative pole, three or four fine needles being inserted through the walls of the sack, and 10 to 15 milliamperes of current passed

until the hemorrhoid has become white from the collection of hydrogen bubbles. The hemorrhoid will shortly slough away as by the previous method. The advantage of these methods over surgery are two: (1) no scar tissues will result, and (2) the patient will not be confined to the house or hospital.

If, following the surgical method, a vacuum electrode, which may be readily placed in position after the third day, is used with the static wave current as described in the treatment of hemorrhoids, induration will be promptly removed and the discomfort, which often follows operation will be relieved, and there will be no scar tissue formed because the induration will be entirely removed from the surrounding infiltrated tissue with a disappearance of pressure and pain. Scar tissue will never form when the induration is kept from the margins of a wound. There is no method for removing infiltration so effective as with the static modalities—the static wave current and static brush discharge, the wave current with a vacuum electrode to cavities and the brush discharge to the surface of the body.

INJUSTICE TO INNOCENCE FROM FAILURE TO REPORT SPECIFIC DISEASES.

The attitude of some members of the medical profession in opposing the stand taken by the New York Board of Health, requiring reports from hospitals of cases of specific disease, is unaccountable. How a physician who sees so often the great injustice to the innocent from not having been duly shielded from contamination by the unfortunate victims of contagious disease, which cause so much human suffering, is difficult to understand. At best, there is no justification from a moral or hygienic point of view for this attitude, and it seems just to attribute the position taken by these men either to stupidity or moral turpitude, in either case an attitude unbecoming a physician.

The time was when opposition existed against reporting

tuberculosis, but there is a change in this particular, and now in the interest of humanity stringent laws should be enacted requiring that every case of specific disease be recorded. The pretext that a physician would thus betray the confidence of his patient is the strongest evidence that the state should require a record, thereby rendering it a duty, and removing the restraint; otherwise the physician becomes a defender and shielder of the vicious and unscrupulous members of society—an ally against the innocent and unsuspecting.

The diseases under consideration must be conceded to be the worst scourges of humanity, and not deserving defense from the members of the profession who know so well the evils they portend. One by one the relatively harmless diseases have been quarantined—diseases not to be compared in their serious consequences with those in question. The time is not remote when failure to report gonorrheal and syphilitic cases will be in violation of law.

OBITUARY.

We are again called upon to announce the death of an active member of the Association—Dr. Frank Little, of Brooklyn, who died at his home, 114 Montague Street, Brooklyn, N. Y., from chronic nephritis. Dr. Little was beloved by a large circle of friends. He was universally esteemed, a generous and thoughtful friend, and an earnest and progressive student of his chosen profession. His loss will be keenly felt by a large circle of lay and professional friends.

IONIC STERILIZATION IN SURGICAL TUBERCULOSIS.*

BY G. BETTON MASSEY, M.D., PHILADELPHIA.

The conditions present in surgical tuberculosis are, essentially, a tubercular deposit, primary or secondary, so situated as to be accessible to surgical intervention.

In spite of this accessibility, nevertheless, the clinical histories of these cases show many instances of extremely tedious healing under the ordinary and classical surgical procedure, such as attempts at excision, etc. The reason for this is readily seen, when we consider the pathologic nature of these deposits and their peculiar relation to their environing tissues.

In the first place, these deposits are neither entirely composed of dead material, nor are they strictly benign tumors with a capsule or other limited membrane. If either of these conditions obtained, their removal would involve merely mechanical difficulties; but the fact is that, in a tubercular deposit, we have an aggregation of living germs, a mass of proliferating vegetable organisms. Moreover, this colony of extraneous germ life owes its existence to the special vulnerability of its host, a lessened immunity being essential to the inoculability of human beings under ordinary circumstances.

This lessened immunity, or consumptive tendency of the tubercular patient, is the chief reason for the failure of ordinary cutting or scraping operations to get rid of the disease, for each cut or scrape merely reimplants the bacilli in the wound made.

It is most astonishing that this contra-indication to the cutting instrument, when the cutting instrument must come in contact with the living germs and make a fresh wound at the same time, has not been more generally conceded. The operator expects, of course, to excise the tubercle or diseased organ entire, and it is possible that this expectation explains the mental attitude towards the operation. But whoever saw a tubercular gland in the neck, or other similar disease focus, removed without its being mangled more or less, owing to its extreme friability? Is it possible for this nest of living bacilli to be pierced by hooks and otherwise roughly handled

* Read on September 5, 1912, before the twenty-second annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

for a half hour without the extruding juices being evident, carrying living bacilli to the fresh wound, even when the organ is removed without rupture?

Progressive surgery must take full account of all advances in biologic sciences, and in this instance should so rearrange its operative procedures as will secure removal of a living nest of extraneous germs without wounding it, or, where this is impracticable or involves too extensive an operation, should adopt the extremely simple procedure of devitalizing the germ colony *in situ* by the process to be described, or some similar method.

This process, described by the writer before the International Electrical Congress, at St. Louis, in its adaptation to tubercular adenitis, is, in brief, the immediate destruction of the bacilli by electrically diffused ions of zinc and mercury, after the manner often urged by the writer, being the minor method of zinc-mercury surgical ionization. The ions being dispersed radially by the current into this extremely good conducting material, the tubercular deposit, will automatically seek out the ramifications of the deposit, and when the ionic action reaches the walls or edges of the deposit will seal the same against any bad effects of the slight traumatism involved in the insertion of the electrode. The dead debris is extruded subsequently as a whitish, crumbly material through the sinus present or created for the purpose, the sinus healing spontaneously after a healthy condition has been produced.

We have in this procedure an ideal technic for the removal of these deposits without operative reimplantation of the living contents. My work in these cases has convinced me, moreover, that the procedure does more for the patient than a mere mechanical removal of the foreign organisms, for it has been evident that a patient subjected to the method improves more rapidly in health than the one from whom a tubercular deposit has been otherwise removed. The local action of the sterilizing ions on the surrounding tissues is possibly of an invigorating nature. Certain it is that these so-called "cold" and insensitive abscesses and sinuses quickly become extremely sensitive under the repeated minor applications usually employed, and this local rise in tropic force or phagocytic resistance is invariably accompanied by steady improvement in the patient's general health.

It is evident, therefore, that while this method of treatment is surgical and direct, there is also a therapeutic effect accompanying it that is equal, if not superior, to the surgical effect alone. In fact, it may be said to be a "cure" for tuberculosis in its surgical forms.

Two recent cases will serve to illustrate this work. In one, a young girl referred by Dr. Seidel, of Reading, Pa., there was a tubercular lesion of the glands of the neck, with an external opening about the size of a silver dollar. This healed nicely at the end of three months' treatment, consisting of tri-weekly applications, beginning with as much as 20 milliamperes for fifteen minutes, the parts were so insensitive, but reduced later to 5 milliamperes once a week. A complete restoration of general health followed.

The other case was one of lupus erythematosus associated with a tubercular wound in the neck, the latter having resisted two surgical operations by incision. Both sides of the face presented numerous slightly raised colonies of growth, surrounded by diffuse areas of reddened infiltration. While making applications to the wound in the neck, the problem of treating the skin lesions was solved by the use of very fine needles of unamalgamated zinc attached to equally fine, light wire, four centers being attacked by passing an electrode each beneath the blisterlike overlying cuticle, and a current of 2 to 6 milliamperes divided between them. Plain zinc needles were used, because the mercury would have dulled the points of the needles, and the result proved that the zinc ion alone was sufficient for these small lesions. Incidentally, it may be said that the zinc ion shows its action by a very white deposit, which is more readily gauged than the grayer mixed zinc-and-mercury ions.

But one application was usually required for each focus, the red aureole surrounding it disappearing as soon as the tiny scab came away. The treatment was a great success, for in the end it turned out that much of the reddened surface of the face was secondary irritation from the twenty or more actually infected centers. The patient declared that he could tell by his sensations when a given area was destroyed, after the subsidence of the local irritation, due to the treatment itself.

There have been no relapses in any case seen so far, though

at least thirteen years have elapsed since the first patient was treated. All continue in the excellent health that followed shortly after the cessation of treatment.

I am confident that we have in this method a practical cure for those forms of surgical tuberculosis in which the colonies of bacilli can be reached by ionization electrodes.

The Massey Sanitarium,

1823 Wallace Street, Philadelphia.

Discussion.

Dr. Jefferson D. Gibson, of Denver. I have never had occasion to use this method but once. I had one case of tubercular cervical adenitis up under the maxilla that was shielded so by the bone that it was almost impossible to get to it so as to make the x-ray effective in removing it. So I used this method with zinc-mercury and destroyed it very nicely. While it is probably quicker than the x-ray, yet the wound left by the needle makes quite an opening, with quite a destruction of tissue.

Dr. Francis B. Bishop, of Washington. We have heard from Dr. Massey on this same subject a great many years, and he always tells us the same story. I do not think any man would question for a minute anything that Dr. Massey says. My experience has not been as large as his. I have had some excellent results in some of these cases, particularly in cases of old ulcers and some cases of epithelioma. I have had a number of cases of lupus erythematosus which I have treated by the x-ray, and I have had good results, but I have had some relapses. I would like to hear the views of those present on the x-ray treatment and on the Massey treatment.

TREATMENT OF CHRONIC DEAFNESS BY HIGH POTENTIAL ELECTRIC CURRENTS WITH REPORT OF CASES.*

BY D. H. YATES, M.D., MADISON, FLA.

In the treatment of any chronic malady we are bound to meet with some disappointments as well as to make wonderful and sometimes miraculous cures.

This has been my experience in treating chronic ear troubles which produce deafness, for it is this loss of one of the important senses that usually sends the patient to the physician, as he finds from time to time that his hearing is growing worse.

I have had my failures, failing with some, when it looked to me from every condition present that I should have effected a cure. We cannot tell from the appearance of the membrana tympani whether the little bones in the middle ear have become ankylosed or not. If they have become so, there is no treatment that I know of that will make any very marked improvement in the hearing; but given a case, either suppurative or non-suppurative, where the stapes, incus, and malleus have not become ankylosed and the patient not totally deaf, I expect to effect a cure in 50 per cent. of the cases and benefit all. In treating these cases, in our effort to restore their hearing, we are often rewarded by the fact that we relieve various other troubles; for instance: I have known nasal catarrh of a chronic nature to disappear under the treatment, and sometimes after their hearing has been restored, they tell me that their eyes had been weak and since the treatment they have no further use for glasses.

My method of treating suppurative disease of the middle ear with an electric current without setting up trouble by metastasis is as follows: I first wash out the ear with peroxide of hydrogen until all the pus cells have been removed before I begin the treatment; I then have a clean catarrhal inflammation to deal with. I do not have to keep up the peroxide washings long as the pus soon ceases to appear under the treatments.

I have noticed in treating chronic or even simple ulcers that you can remove all the stasis in and around the ulcer with this modality. The blood vessels are contracted and for

* Read at the twenty-second annual meeting of American Electro-Therapeutic Association at Richmond, Va., on Sept. 5th, 1912.

a time the ulcer appears healthy and in a condition as to begin to granulate, but after a few hours the blood vessels again relax and the parts again become vascular. You would expect the same condition to exist in a chronic inflammation of the middle and internal ear. If so, it stands to reason, that as soon as the blood vessels begin to relax, you should be on hand with your electric current to again contract them and prevent the impending stasis and consequent congestion and infiltration.

I never use my static machine on Sunday; this is the only day that my patients do not get their daily treatments, and nine-tenths of them come in on Monday feeling worse, as they term it.

I therefore have no hard and fast rules to go by, each patient having their own peculiarities. Taking two patients of the same degree of deafness and to all appearances, the same degree of injury by the chronic inflammation, one will respond with half the attention that the other will. Some cases that would not show any improvement by the usual bi-daily treatment of thirty minutes each, will show improvement by seances of an hour each.

The time required to make a cure is from one to three months.

I usually promise a cure in any case who can hear a watch when not directly in contact with the ear, but have cured some worse cases as my report will show. I have failed however, to effect a cure in cases who could hear a watch when tightly pressed against the ear. I attribute these failures to the possibility of the auricular bones being ankylosed.

My method of treatment is as follows: The patient is seated on the insulated platform of a static machine. The hair is tied back with a piece of surgeon's bandage so the current will not be attracted off to a point where it will not be effectual. Then a multiple pointed electrode is fastened to the x-ray tube stand and connected to the positive pole or prime conductor, and the electrode is then placed in such a position that a good heavy electric spray can be directed into the ear least affected. The electrode should be placed at such a distance from the ear that no accidental sparks can fly against the ear; this will depend on the size of the static machine, the speed, and the amount of humidity. The

stronger the spray, however, the more effective the seance will be. I usually place the points of the electrode from three to five inches from the ear. The circuit is completed by securing with bandage a piece of composition metal over the other ear, just large enough to cover the lobe, $2\frac{1}{2}$ in. square. This is tied on the head by a strip of bandage and connected to the negative side of the static machine by light wire. The speed of the machine should be so regulated that the patient will get all the current he can tolerate. The sliding rods should be widely separated so no accidental sparks will pass. The flow of the current will traverse the tissues between the two electrodes—the middle ear and eustachian tube of both ears. This current also passes through the nerve centers at the base of the brain, thereby favorably affecting other parts. This spray removes the congestion in the middle ear until it ceases to return and with the normal circulation restored, and with the infiltrated mucous membrane brought back to practically a normal condition, the hearing is finally restored.

I usually begin with two seances daily of from twenty to thirty minutes each, if the patient has time to take them, for the first two weeks or a month, according to the response, and afterward I only give one seance per day. I never could get satisfactory results in the treatment of any inflammatory trouble, with two or three seances per week.

Case 1.—Miss L., age 21; came to me for treatment in March, 1904. She had been deaf since childhood, and came of a nervous family. I think her mother died of pellagra about twenty years ago, although I never saw her, I only arrived at this conclusion from the history of the case.

The patient claimed that she was born deaf in the right ear, but could hear a watch when tightly pressed against the left, and had frequent attacks of earache followed invariably by suppuration in both ears if she took a ride in the night air, got her feet wet, or ducked her head under water while bathing, she had earache the following night with suppuration following later.

I began treatment as above described directing my attention to the best ear. After one week of two thirty minute seances each day, she could hear a watch one inch from that ear; at the end of a month she could hear it held two feet from that ear. After finding this improvement I placed my

watch against the right ear, and to her astonishment, she could hear it plainly. I will never forget the astonishment that this patient manifested when she found that she could hear with that ear. In the meantime she informed me that she had been in bathing in a large cold spring about a week before, and against her will, she had been ducked several times by her friends, without the usual earache following. I then reversed my treatment, directing the many pointed electrode to the right ear, and the composition metal to the left. At the end of the second month of one thirty minute seance daily, she could hear a watch two feet from the right ear. Eight years have elapsed; there has been no more earache, and no more suppuration in her case. I saw her a month ago, and she could hear the slightest whisper.

Case 2.—An old negro walked into my office and yelled at the top of his voice, "Doctor, I want you to do something for me; I loss my hearing, and I loss my voice too; I can't hear and I can't talk; I loss 'em both at once." I took him by the arm, placed him in position, and turned the current on. In about ten minutes he said, "Dat'll do Doctor, I hears all right now."

I think the deafness in this case was due to paralysis of the acoustic nerve and the electric current suddenly restored the function of these nerves.

He thought of course, that he had lost his voice because he could not hear it.

After this seance, I learned that he was a wood chopper and had had a case of heat prostration and paralysis of the acoustic nerve was the result.

His hearing was apparently normal when he left my office. I have never seen or heard of him since.

Case 3.—I. C., a deaf mute of Moultrie, Ga., had been examined by many ear specialists and informed that nothing could be done for him. He was visiting his brother in our town. Had been kept in a deaf and dumb school ever since he was old enough. He could converse with his hands almost as the average person could talk.

I became interested in the case from the fact that he could hear thunder, the whistle of a locomotive, and a shrill whistle made by placing the two little fingers in the mouth. I noticed that he would try to imitate these sounds and would

succeed fairly well. The thought occurred to me, if he can hear these loud sounds, he must have all the organs of hearing, and if he can hear at all, why can't this hearing be improved, and if it can be improved, why can he not learn to talk after he learns to hear? With these ideas confronting me, I induced him through the influence of his brother to go to my office for examination. I found both ears very small, both the lobes and the external auditory canal not larger than you would expect to find in a child of seven years, and the drum in the right ear had a large perforation and showed evidences of former suppuration. The drum of the left ear was intact.

After writing to his father, he agreed to let him take one month's treatment, provided I would make no charge if he was not benefited, which I agreed to.

The treatment was begun in December, 1909, in the manner previously described, twice daily, morning and afternoon.

We noticed no improvement for about ten days. Finally I took him home in an automobile one day and from the time the engine was cranked he was pointing to it and imitating the sound of it. On the way we had to pass a cotton gin which was running full blast. His attention was attracted by the sound of it. After we stopped the engine I tested his hearing and he could hear my watch when tightly pressed against his left ear.

Treatment was continued to the end of the month at which time he could hear a watch six inches from his ear, and I had taught him to say many words by holding an article up and having him call it after me, such as pencil, book, knife, pin, etc.

About this time he received a letter from his former professor telling him what a grand time the deaf and dumb boys were having at school, and he set about making his father send him back. Being afflicted, petted, and spoiled as he was, he succeeded in getting back to the deaf and dumb school. His argument was that one ear was no good without the other.

A few months ago I had the pleasure of seeing him again. It was quite interesting to hear him talk and continue his deaf and dumb spelling on his hands, and in the meantime hold his hand to his left ear to catch your reply.

At this time he could hear a watch two or three inches and talk as well as a three-year-old child.

He is very eccentric, and sensitive about his condition and still does not appreciate the little that I did for him. He says, "Hearing no good."

I acknowledge that these are three of the cases of my best results.

I could report many others with varied results but I hope this will be sufficient to induce many others to enlist in this work, and restore the hearing of many of this class of sufferers. Last but not least you will find this modality to act like magic in acute cases, thereby preventing chronic deafness.

Discussion.

Dr. G. E. Pfahler, of Philadelphia. Did you take this boy to Dr. Calhoun or any other ear specialist?

Dr. Yates. Dr. Calhoun is dead, and I did not take him to anyone else.

Dr. Pfahler. If we want to receive any recognition from the rest of the profession we must take the word of the men whom the rest of the profession recognize. It is for the good of the specialty.

Dr. William Benham Snow, of New York. I think it would be a good idea to take him before the county society in the community where he is known and have a discussion on the case.

This is an absolutely unique and original treatment. There is a question whether this current produced a contraction or a dilatation of the blood vessels. The current the way the doctor uses it is absolutely harmless. I fully believe Dr. Yates report. He has made his statement rather conservative, admitting that he got his best results when the hearing was perceptible at a little distance from the ear.

Dr. William T. Bishop, of Harrisburg. The suggestion made by Dr. Pfahler is a good one, and it is unfortunate that it has not been followed in all cases. I think that has been one of the serious mistakes. Another mistake made, which our friend made, and which I have heard made a number of times here during this meeting—we talk about the current as if it went in a straight line. That is not scientifically true. If it were true we would not have the erratic course of light-

ning. It is unfortunate that loose statements are made. We ought to be careful when we talk about scientific things, and adhere to what other people have proven.

Dr. Snow. Dr. Bishop does not take account of the fact that the current is passing through a conducting medium, not through the air, through which it does not go in a zig zag course. High potential currents always go in straight lines between two electrodes through a conducting medium.

Dr. M. G. Campbell, of Atlanta, Ga. Two years ago I had a personal experience along this line. Both my ears became congested. I went to a specialist next door to me in the building where I have my office. He examined my ears and said they were very much congested. I could hardly hear my watch tick. I told him that I was going to use the static wave current on my ears. He said he wouldn't do that. I said that I would. I got an electrode that fit the ear—a high frequency tube connected with the positive pole, and grounded the negative. I put this to my ear and in less than five minutes the ear was open. I repeated that with the other ear. I went back to him and asked him to examine the ears. He said the congestion was almost relieved. The next day I tried it again, and the ear was entirely clear. He examined my ears and told me that the congestion was entirely relieved.

I have tried it in a number of other cases, and have given a great deal of relief; that is with the static machine. I have tried it with a No. 4 Victor machine and I have not gotten the success with that machine that I did with the static machine. I do not think it gives the mechanical exercise that is necessary to relieve the congestion there. It gives more heat than it does mechanical effect.

I have a case now that I am treating for epithelioma of the nose by fulguration. This old gentleman has deafness, and I have treated it with the current from the Victor No. 4, but I have not gotten the result that I expected to get. When I get home I am going to try this static method.

Dr. Jefferson D. Gibson, of Denver. This spray that the doctor uses is a very powerful agent. If you remember, I reported here some ten or twelve years ago a case of lupus, the worst I ever saw, in which the nose was eaten off, a great hole in the cheek, that I absolutely cured with a modification of the doctor's spray. It was cured in twenty-nine treat-

ments. I showed it to the Medical Society in Birmingham, Ala., and there was not one there who had not tried to cure that patient at some time.

If you have got a catarrhal inflammation anywhere in the ear, in the eustachian tube, the drum, or the labyrinth, you can cure it with that discharge.

Another thing. The doctor with his many-point electrode is not getting as powerful results as he would with a little wooden point static electrode. You bring that up to the ear and it will get so sore that you will not have to treat your patient so often.

Dr. Yates. I live where the doctor is obliged to do things in every specialty.

The fact that this man is here, living, hearing, and talking, whereas he was once deaf and dumb, and that I can give you references to the man's father and others who know him, ought to be sufficient to convince anyone.

Dr. Snow raised the point whether this current dilates or contracts the blood vessels. It has been an unsettled point in my mind which it does. But let it be either, you are going to do good because I know I have never made a total failure, out of a large number of cases. I do select the cases. The current at least tones them up and they seem to improve for months afterward. Where the positive electrode is applied I believe it contracts the blood vessels, but where the current comes out at the negative it seems to relax. In some cases, especially old chronic non-suppurative catarrhs, you have more of an atrophied condition instead of a state of congestion. If that be the condition present, it is then that the dilating influence does good by causing a hyperemia on the negative side.

COMMITTEE REPORT ON BODY CURRENTS.*

BY FRANCIS B. BISHOP, M.D., CHAIRMAN.

It is accepted, I believe, as a physiological fact, that any unexcited point of a muscle or nerve is at a different potential from any excited point, and any less excited point is at a different potential from any more excited point, and that the difference of potential is such that the current will pass from the unexcited to the excited point through the tissues, and through the galvanometer from the excited to the unexcited point. Thus it would seem that when a muscle or nerve is irritated, a molecular disturbance is created with a disassociation of the positive and negative ions, and may or may not reverse the natural flow of the tissue currents, or the currents of rest, according to the location and degree of the irritation.

Brown-Sequard, Eckard and others established, beyond all manner of doubt, that a production of electricity is constantly going on in all the tissues of the living animal body.

The researches of Du Bois-Reymond and Matteuci have shown that the production of currents depends on the nutrition of the muscles, and particularly on the oxidation of their tissue.

Du Bois-Reymond has established as a law that every point in the natural or artificial longitudinal surface of a muscle is positive in relation to every part of its transverse surface; and as the tendons, which are conductors, are in communication with the natural transverse surface, it follows that they are negative as regards this surface. Du Bois-Reymond says that the smallest part of a muscle acts in the same way as the whole of it, except that the current is less and less powerful as the part is smaller. Each elementary bundle of fibers in a muscle seems to be like a couple in a galvanic battery.

According to experiments made by Du Bois-Reymond and by Brown-Sequard, the laws regulating the diminution and the disposition of muscular currents are the same as those of muscular irritability, i.e., the muscle current diminishes with the diminution of muscle irritability. This law seems to hold good in the nerve also.

*Read before the twenty-second annual meeting of the American Electro-Therapeutic Association, at Richmond, Va., on Sept. 3d, 1912.

Whether these normal physiological currents are the cause or are the result of the metabolic changes that take place preceding and during a nervous impulse, or a muscular contraction, I do not presume to say, but research in physical chemistry within the last few years goes far to sustain Loeb in his conclusions, that all metabolic changes that are constantly taking place in the tissue of the body are due to the negative and positive ions, and their electric charges. At any rate there is no longer a question as to the presence in all living matter of currents of rest and currents of action, and that their normal physiological function may be disturbed and frequently reversed by certain pathological changes. We know that the normal reaction of a motor nerve and muscle is known as K.CC. of the galvanic current and that they contract vigorously to either pole of the faradic current. Under the influence of fatigue these reactions are modified in proportion to the extent of the fatigue upon the muscle and ganglion cells, and when the muscle is cut off from its motor nerve supply in the anterior cornua of the spinal cord, the normal positive reflex conduction of the nerve to the muscle is suspended and the muscle and nerve is inert, and relaxed, bathed by the alkaline blood and fluids, which contain the negative ions in greatest proportion. A.CC. now becomes the current of selection for the stimulation of the nerve or muscle to contraction. The study of the internal secretions indicates that the secretion of the parathyroids exercise an inhibiting influence over the tissue currents or at least over the motor ganglia and perhaps over the reflex arcs as well; as we well know that when the parathyroids have been removed tetany almost invariably follows and that any irritation to the surface of the body will throw the muscles into spasm, and that all of the normal electrical reactions are greatly intensified. Prof. Bose of Calcutta, in his very numerous and carefully conducted experiments upon metals, plants, and animals, including man, has shown that all tissues are subject to fatigue; even metals under stimulation are subject to fatigue, and that the normal electrical current in all of them is subject to variations of polarity, according to the degree of fatigue, until eventually the polarity is reversed.

He has succeeded in poisoning metals to such a degree as to inhibit the flow of the current normal to the metal. For

instance, he would take a piece of selenium (which we know is extremely sensitive to light), connect the two extremes to a very sensitive galvanometer, a ray of light thrown upon the selenium immediately caused a current to flow through the galvanometer. If, however, the contacts were moistened with a solution of oxalic acid, a block in the current was shown and no current passed. Other metals subject to other methods of irritation have shown the same effects from poisons. Mr. W. K. Carr, of Washington, informed me that he has repeated the experiments of Prof. Bose with like results.

Prof. Bose has also shown the effects of various poisons in inhibiting the electric flow of current normal to the various vegetables and plants—as well as animal tissue. That the body currents are filling a very important place in diagnosis is shown by the prominence given to the Einthoven Electrocardiogram in the diagnosis of heart lesions. An interesting paper upon this subject appeared in the February 4th, 1911, number of the *Medical Record*, written by Dr. Thomas R. Satterthwaite, of New York. In the *Record* of August 3, 1912, appears an abstract of a paper by Dr. T. Lewis, "Clinical Importance of Electro-cardiography." T. Lewis notes that galvanometric examination of the heart is important from many points of view. It may give indications of enlargement of the walls of one or other cardiac chamber. It may accurately locate small lesions in the musculature. It informs one when the heart beat starts at the normal impulse center or away from it; in the latter case it indicates that the rhythm is no longer under the normal nervous control—a fact which is of fundamental importance in the management of a case. It gives a separate record of contraction in auricle and in ventricle, and accurately defines the time relation of contraction in one chamber and in the other; thereby it frequently elucidates physical signs which otherwise remain obscure. It provides a perfect means of ascertaining the functional efficiency of the auricular ventricular bundle, the sole conducting tract upon which the ventricle depends for the reception of impulses which start its contractions. It enables one to differentiate between separate forms of slow and rapid heart action, which are of totally different significance. It provides an analysis of every form of cardiac irregularity, an analysis

which is unrivaled in its precision by any other method. While the information derived from it relates essentially to the condition of the muscle, the method is often helpful in the diagnosis of lesions of the valves. It brings one into nearer contact with the functions of the heart muscle than does any other clinical method. It is, in short, a precise means of studying the heart as a living and moving organ.

It is hoped that the time will come very soon when the functions of other organs may be registered by similar means. That the various sensations may be registered. The emotions have already been registered. When the functions of the organs through action of the normal body currents shall be registered, we will then be able to record, at least, the action of our electric currents upon those organs. Your committee is aware that this report is very imperfect, and conveys but little real information, but it is a beginning—upon a line of thought—which if carefully investigated may lead to valuable definite results in the study of therapeutic application of electric and other forms of stimulation. As it is now we believe proven that all forms of stimulation provoke electrical response in tissue. Therefore may we not say that all forms of stimulation treatments are in the end electrical treatments.

On motion the report was accepted and placed on file.



DIATHERMIA AS AN EXCESS RATION*.

BY DR. J. BERGONIE, PROFESSOR AT THE UNIVERSITY AT
BORDEAUX.

Some organisms are truly fortunate. Their constitution, their form, their surface, and their weight are such that from the standpoint of energy they require the minimum of expenditure to maintain their homeothermia. If we represent the human organism schematically as a cylinder as Ch. Bouchard has done, and imagine two subjects, the one being indicated by a regularly formed solid, and the other by a long grooved cylinder, the two subjects having the same weight but their surfaces being entirely different. The surface is much larger in the long grooved cylinder, and their constitution may also be quite different; one person may have hereditarily large bones but with small muscles to move them, and another as if infiltrated without being pathological, and these were formerly called lymphatic. Suppose it were thus with our "channeled" subject and we would have an organism with an enormous external radiating surface, with a small total weight, and its useful weight, the bones and lymphatic system subtracted, still more limited. The living ego of this organism would be reduced by several kilos. Let us put these two organisms in a chamber at a temperature of about 25° C., and let them lie there fasting and without clothing in order to simplify the starting point. The one, the solid cylinder without grooves, by means of the beating of the heart, the general circulation, the life of the numerous cells, the vital functioning, and in a word, all the organs and tissues, will reduce and degrade enough energy to produce sufficient heat to conserve its homeothermia, but the other, the grooved or channeled organism, its living mass being infinitely reduced will not be able to maintain an analogous equilibrium. An equal "power"† of nutrition produced by a

* Translated from the *Paris Médicale*, January, 1913, by Eden V. Delphey, M.D.

† A unit of power in mechanics is a quantity of work divided by time. In physics the unit of heat is a quantity of heat divided by time or by weight. Why therefore should we not indicate the vital power of an organism by the energy liberated in a unit of time by a unit of weight by the organism under the forms of heat-work-light?

given number of cells would not be as great as that produced by a number of cells twenty times as large. It will be necessary therefore on account of this deficit, to add another quantity of heat produced expressly for the purpose, because of the excessive radiation, in order to maintain the proper temperature of the subject and thus conserve its homeothermia, without which it would not be possible for a considerable time. In such an organism there is no deficit, but there would be a deficit if the temperature were lowered by the lessening of the quantity of heat arising from vital functioning. In inanition the destruction of the "ego," already so reduced, is but a matter of time; it will be necessary therefore to burn up the machine itself if it is desired that the organism should live. If it is to be done by feeding, it will be necessary to subject not only the digestive apparatus but also the heart, the lungs, and all the tissues to an intense overwork in order to digest, assimilate, and to burn this enormous mass of thermogenetic food necessary. This overwork will not be without a severe strain and wear upon the organs and apparatus thus employed and some giving-out will probably occur and interfere with the result. This will lower the output, and if the output is diminished, the entire machine is definitely compromised.

How can we succor such an unfortunate organism, in whom it is necessary to digest enough food in order to live? There is only one rational means: in place of giving this organism food which it must digest, assimilate, and burn up so laboriously, in order to obtain the heat-energy which it contains, it is better to derive the necessary heat directly from nature. In that manner we avoid the digestive overwork which cannot be prolonged without danger, and thus supply the deficits because the external sources of heat are practically inexhaustible. Can we therefore say that we can get along without food altogether and give the digestive tract complete rest, as is sometimes desirable, and replace entirely the total alimentation by the infused heat? No, because the cellular life referred to cannot draw its necessary energy except from the complex and varied chemical architecture of the aliments which the blood carries to it from the digestive tract. There is a minimum of indispensable alimentation which is proportionate to the truly living mass of the organism, in

order to nourish the activity of the metabolism of this mass (vital energy). What is this minimum which it is necessary to draw from food? Lefevre has estimated it at a little more than 1,500 calories in twenty-four hours for a normal man. Considering 2,500 to 3,000 calories as the total daily requirement, this would be between three-fifths and one-half. But for a marasmic organism, with a feeble living mass, (compared to the long grooved cylinder, described) the minimum of energy to be furnished by assimilated food will be notably less. The margin offered for physical medication by the transfused heat of nature replacing alimentation increases more and more as the organism under consideration departs from the normal state of equilibrium. It is a happy circumstance and not exceptional in physiotherapy, that the more grave the condition, the more efficacious the treatment.

Technique.—But how shall we cause this heat of nature, this *excess ration* whose general indications we have indicated so rationally, to enter into and be assimilated by the organism? At the outset we shall refer to the saving of heat by the organism by clothing, by warming apartments, and periodic migrations to warmer climates; and these are far from being negligible. Under particularly favorable circumstances, these will very much diminish and even annul the need of furnished supplementary heat, but to thoroughly discuss it would require many pages. Except in these exceptional cases, the replacement of alimentation by superadded heat is generally legitimate. But how shall we cause this superadded heat to enter into the organism and be assimilated? In physiotherapy, there are many means of heating the organism: the light-bath for example, is really a heat-bath and will serve the purpose. But after the bath the subjects very soon lose by radiation the heat accumulated in feeble quantities by the superficial layers of the body. Yet we have a still better method than that of making the heat in nature penetrate into the organism; it is *diathermia* or *thermo-penetration*. This admirable method is due to the work of d'Arsonval as are so many other methods of electricity daily employed. But when he gave us this method at several sittings of the Academy of Sciences and particularly on July 3, 1893, upon the subjects named Cornu and Marcy, notwithstanding his sensational demonstration, we were far

from thinking that a current of 3 and 4 amperes could pass through the body without damage, and simply heating it according to the law of Joule, and that electro physicians would not soon be utilizing and applying it. But diathermia had come too soon and to a physiotherapy too young. Since then we have taken hold of the truth. The high-frequency currents, of which diathermia only one variety, have been used and abused in attributing to them miraculous properties until the good name of French electrotherapeutics has been almost compromised. But there is nothing mysterious about the currents of diathermia, everything is clear and easily explained. The thermic amperemeter, the most accurate measuring instrument, shows that 2 to 3 amperes traverse the body of the subject without injury at a potential difference of 1,500 to 2,500 volts, and furnishing 3,000 calories each hour which is greater than the daily alimentary ration. Regarding the well-known theory which explains the intense effects of the currents by trains of waves very close together, I shall say nothing; it can be found in the classical books on the subject. The producing apparatus are also well known. The ones I use are very simple to manage and very certain in output. There are various models of electrodes, but those which are composed of substances depending on saturation with water should be rejected. They reduce their caloric capacity and there is risk from the heating of the water, we do not want a poultice. Those which we use at Bordeaux are composed of plain metal: lead, tin, or aluminum in thin sheets. Sometimes the edges are protected by a narrow strip of adhesive plaster to prevent sparking. A terminal is fastened to one corner and then it makes a perfect electrode. The surface may be large or small according to the indications. Our electrodes for the application of diathermia vary from between 200 to 500 square centimeters. The electrode is applied directly to the surface of the body and bound on tightly with a bandage without fold or wrinkle. When the skin is very dry, the surface may be moistened with a few drops of water rubbed on with the hand so that the electrode will be equally moistened. With this very simple method we have yet to see the first burning of the skin following the application of diathermia. The distribution of the electrodes upon the surface of the body for the application

of diathermia for the purpose of general warming, or to use the expression *nutrition by heat*, is not made according to precise rules. Nevertheless, the members being linear conductors they will warm up at the location of their minimum section: the arms at the wrists when the electrode is in the hand; the legs below the knee, at the garter, when the electrode is on the calf. All the electrodes of the right half of the body are connected in "quantity" with one of the poles of the apparatus, and the electrodes of the left half of the body with the other pole. There is no electrode applied to the trunk. It is simply traversed by the lines of flux coming from the members. The patient is uncovered as little as possible; the application of the electrodes should be rapid, simple, and perfect. Other arrangement of the distribution of the electrodes may be tried. The total surface of the electrodes is from 1,200 to 1,500 square centimeters per pole or per side of the body. With an intensity of 1 to 2 amperes, this makes a mean density at the point of entrance of the current of about *one milliampere per square centimeter*. Such a density gives a large margin of security and which can safely be surpassed if necessary. These are the principal points in the technique of these curious applications; there are many others which are better understood when seen than described, because if medicine in general is an art, physiotherapy is its grand-daughter, but yet on the other hand very much more complex. Every physiotherapeutist should serve an apprenticeship at the atelier, at the laboratory, at the clinic; an apprenticeship which nothing can replace. Success in physiotherapy is not a matter of instruments, it is an affair of the skillful hand as it is in surgery.

Indications.—It is necessary to know what are the indications and what are the objective results to be obtained by this method. The general indications are very easy to formulate because "whenever it is desirable to give an organism an increase in energy under the form of sensible heat, diathermia in generalized applications to the entire body is indicated." What are the particular cases, the clinical cases in which this method of treatment should be employed? I shall cite only a few so that this paper shall not be too long: First, there is that state of physiological misery which is a precursor of or is consecutive to a great number of affections. The organ-

ism is poor in energy and yet it is necessary to face a loss, often considerable, especially of heat. If it is not able to face this loss, hypothermia occurs leading to a state of grave danger. *Diathermia* will combat and efface the *hypothermia*. Also, hypothermia is a particularly grave symptom in a number of diseases, in athrepsia or sclerema of the new-born for example. We know that in the infant resistance to hypothermia is much less than in the adult and this is in a geometric ratio as has been shown by experimental evidence (Richet, d'Arsonval, Rubner, etc.). In the animal kingdom the weight decreases according to the cube of the homologous dimensions, while the surface decreases according to the square of the same dimensions. Now the weight represents the sum of all the living cells which produce energy and therefore heat, while the surface is the open door for all the calorific losses. These are two reasons in addition which lead to hypothermia. Hypothermia caused by a prolonged exposure to cold is very rare in human medicine; but this may be added to other causes, such as physiological misery, marasmus, inanition, etc., which we are obliged to combat. The best means with which to attack it with certainty is diathermia. In certain chronic diseases, such as cancer of the liver, of the stomach, stricture of the oesophagus, etc., hypothermia always occurs as a complication and as a grave consequence of inanition. The indications for the absorption of heat is very clear in these cases. For sick people, it is not sufficient that we simply protect them from cold, they need an increase of natural heat and diathermia is best able to produce this no matter what other method of warming may be employed. Moreover it can be renewed again and again whenever necessary without inconvenience. Sometimes anaesthetized patients become hypothermic notwithstanding the precautions observed in the operation room and afterwards. This hypothermia may be prolonged by the fasting which precedes and succeeds the operation. Of all the methods which can be employed to overcome this hypothermia, diathermia after the operation is the best. Large hemorrhages have a very demonstrable effect in lowering the temperature. This is combatted by infusions of normal serum, but warming, especially by diathermia, should also be employed. Periods of alidity which supervene after ex-

tensive traumatisms, especially of the nervous system, are well known and sometimes difficult to overcome; with diathermia, whose action can be measured and graduated with perfect precision, there will no longer be any difficulty in raising the severely wounded to normal, and that without any sensation or risk. It is the same with the hypothermias of the burned, the intoxicated, and the auto-intoxicated; with the periods of algidity of certain severe diseases; the almost physiological hypothermia of senility, etc. Moreover it is not only hypothermia which it is desirable to combat by diathermia; an organism which uses up all its reserves, and even its own machinery, should be rescued by diathermia even if there be no hypothermia. It will be the best preventive treatment, and the best means in aid of the conservation of the normal temperature. Finally we refer to this as a means of producing a beneficent hyperthermia, a reactional fever which is recognized as being so useful in cases of infection. Besides the simplicity and efficacy, this method presents this enormous difference from spontaneous fever that it costs nothing to the organism which it defends; when the period of hyperthermia is over, all its forces, all its reserves are intact. Is it not truly an ideal treatment? But this is a departure from our subject and there is so much to say. Local applications of diathermia are equivalent to a new and perfected Bier method, and will warm up a deeply seated organ in the same manner that our forebears warmed up a superficial one.

Results.—We divide these into two parts: experimental results and clinical results. For the first, I refer to the very excellent thesis of one of my assistants, M. Rechou, who made the experiments in my laboratory and under my direction. I shall merely summarize here: M. Rechou was able very easily to elevate the central temperature of animals and to produce a mortal hyperthermia; in man there was determined a considerable variation in the temperatures axillary and central in two experiments with diathermia: the one with a current of 600 milliamperes and the other with a much greater one, 1,700 to 1,800 milliamperes. The arterial pressure is elevated by diathermia by from 15 to 19 millimeters of mercury in five minutes with 1,500 to 1,800 milliamperes of current. This was foreseen. But the most important is

the lowering of the respiratory changes of the organism diathermatized. The following are the averages found by this author:

| Before Diathermia. | | After 30 m. of Diathermia. | |
|--------------------|----|----------------------------|-------------|
| 2 litres | 95 | Oxygen consumed, | 2 litres 14 |
| 2 " | 62 | Carbonic acid expired, | 1 " 96 |

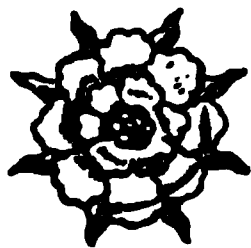
Can there be a more clear demonstration of organic economy realized by diathermia and the substitution of the heat it furnishes from nature, and that drawn from food? From a clinical point of view the results are no less convincing. Whenever applications of general diathermia have been made to sickly, pitiful, marasmic, weak, hypothermic subjects, I have seen their temperature, their weight, their strength, and their arterial pressure increase, and this is entirely rational. I have also seen their digestive troubles improve, their bowels become regular, their alimentation become more intensive, more easy and more varied; in several months, I have seen these organisms change from a state of physiological misery to a condition in which they were capable of physical and intellectual work, with a good resistance and normal in every regard, and after their return to normal they had no further need of diathermia. The following is a summary of one of these cases:

F. B., 27 years old, height 1 m. 76, weight 49 kgs. 500, systolic arterial pressure 135 millimeters, amplitude of oscillations 3 divisions of Pachon's oscillometer. He has been subjected to various regimes, has had a number of series of injections with increasing his strength. Repeated attacks of enteritis, can only be nourished by eggs, mutton, butter, and eats a great deal; requires grains de Vals frequently; tongue coated; cephalgia; ringing in the ears; weakness very great; can not walk 100 meters without being accompanied and supported; lies down at night very much fatigued; neither physical nor intellectual work is possible; constant hypothermia; axillary temperature 36° C. He is very sensitive to variations of temperature; does not go out of doors in winter; apartment heated to 18° C. minimum; *en resume*: at the last degree of physiological misery.

Treatment.—General diathermia, two seances a day, three to four hours after meals. Moderate intensity: 1½ amperes; duration, 40 minutes.

After thirty-five days of treatment.—Weight, 63 kg. 450; systolic arterial pressure, 155 millimeters (after each seance this pressure rises to 160 and 165 m.); amplitude of the oscillations, 7 and 8 divisions; pulse, 95 after the seance; axillary temperature before the seance, 37.2° C., rising at the end of the seances to 40.3° C.; no more enteritis; alimentary ration reduced notwithstanding the reduction in the temperature; eats everything, salads, fruits, legumes, meats, etc.; walks for hours without fatigue; improvement progressive; no more grains de Vals; does an appreciable amount of intellectual work; faces all temperatures, slightly clothed; his corporeal aspect and his life are those of a normal man.

I might report a series of similar observations, but they will only confirm what has already been said: that we have in diathermia the most efficacious and the most rational means of succoring organisms who are in a state of physiological misery from any cause whatever, in carrying to them under the form of natural heat, an excess ration which covers their deficit in energy without putting the digestive tract to any effort whatever.



Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M.D.

Cancer a Motile Germ.—We have had evidences all along that the living thing that causes the wild proliferation of normal tissue cells in a malignant growth is motile and auto-inoculable, and yet we apparently have not realized the true meaning of the clinical phenomena indicative of these facts. Like other great truths, the full meaning of these indications have escaped us, and we have continued treatment practices, such as wounding the growing edges and thus stimulating growth, a practice most marked in curettement and nearly as bad in imperfect cutting operations that wound and reinoculate instead of removing entire without possibility of this accident; and we postpone effective operation in still local growths, giving additional time and opportunity for automotile cells to spread further into the surrounding tissues and metastatize to distant organs.

Some of these clinical evidences of motility are summarized by the editor of this department in a paper read before the West Virginia Medical Association at Webster Springs in July, 1912 (*Am. Journ. Clinical Med.*, March, 1913, p. 230), as follows.

Character of the Cancer-Cell.—The most important fact to be noted is, that the whole clinical history of a malignant growth indicates that its living components are motile, omnivorous entities, the degree of motility and voracity bearing direct relations to the degree of virulence.

Analyzing the facts more closely, it is evident that the degree of malignancy of a type of cancer or of an individual growth is but another term for the degree of the motility and voracity of the cancer-cell present in the growth. For what do microscopists regard as the essential condition present in a histologic section determining malignancy and by which a diagnosis of cancer is arrived at and its degree of virulence measured?

This essential finding, without which no diagnosis of malignancy is made, is merely more or less erosion of normal histologic elements and their replacement by migrated cell groups other than leukocytes. In other words, cancer is diagnosed at present, not by finding and recognizing so-called cancer-cells, as was formerly claimed, but by the evidences of a migration and conflict between the cells of the new growth

and the normal cells of the part. The normal cells, even of the hardest osseous tissues, are destroyed, and in their place are found the foreign cells in riotous abundance.

The microscopic slide, it should be remembered, gives us a view of the conditions present at the moment of death. Sections at the edge of a malignant growth doubtless show us a picture of a battle-field taken at a single moment of the progress of the conflict. When the moving-picture machine can be successfully applied to this subject we shall know more of it.

The microscopic slide, then, is our strongest proof that the *materies morbi* of cancer is motile, for it is impossible that we can have erosion without motility of the eroding agent.

But, I should not say that the microscopic evidence is the strongest, though doubtless it is the most convincing. For what is the appearance to the unaided eye of the average cancer but one orgy of erosion, the growth devouring neighboring structures so clearly and distinctly that the facts are evident to the mere layman?

By some sort of mental inertia we have allowed the true significance of this erosion to escape us.

If the picture of a neglected carcinoma does not convince you that we have a moving, boring entity to deal with, consider certain facts of autoinoculability.

Autoinoculability.—It is true that the inoculability of cancer from individual to individual, even of the same species, is difficult, although it has been frequently accomplished of late, in the lower animals, the difficulty doubtless being explained by the fact that the experimenters have been trained mainly in the handling of vegetable organisms, while the cancer organisms most likely are protozoal. Still, when the question is one of autoinoculability, the ease with which this occurs in a susceptible individual is evident in nearly every case.

I have seen many secondary growths in an epithelioma of the face, implanted by the finger-nails of a careless patient. There is evidence that a carcinoma has been transferred by the knife of the operator from such a growth in the ovary to the clean cut in the abdominal wall, as mentioned by Cullen and others. There are numerous evidences of autoinoculation in the local recurrences so common after imperfectly performed knife operations.

The phenomena of metastases, or secondary growths in the individual are, in reality, instances of spontaneous autoinoculation. The mode of formation of these so-called metastases, which rather should be called colonies, is well known to be by the protrusion of a graft or of a single infected cell into the lumen of a vein or lymph-vessel, which later is broken loose from its attachment and floated onward through the vascular system until mechanically arrested, where it proliferates as a daughter tumor.

W. J. Mayo, of Rochester, Minn., contributes a paper on accidental grafting of carcinoma during operations to the *Journal of the American Med. Assoc.*, Feb. 15, 1913, in which several personal observations are recorded, together with a drawing illustrating a carcinoma growing on a clean colostomy wound after a second operation twelve days later, in which a cancer of the rectum was operated upon. He surmises that living fragments of the rectal wound had been discharged upwards, and one or more had become attached to the granulating surface some sixteen or eighteen inches away.

But, the most interesting contribution to the biology of cancer recently made is the original work of Erwin F. Smith, pathologist in charge of the Laboratory of Plant Pathology, Department of Agriculture, and I advise readers of *ADVANCED THERAPEUTICS* interested in the subject to send fifty cents to the Department at Washington for Bulletin No. 255, Bureau of Plant Industry, in which Dr. Smith illustrates most beautifully his researches on the pathology of plant-cancer.

It seems that Dr. Smith has isolated, cultivated and reproduced an endocellular motile parasite that is the cause of crown gall, or cancer of the daisy plant, the life history of which is closely analogous to what must be the life history of the parasite of human cancer. For the first time we have an adequate explanation of how a previously normal tissue cell becomes malignantly proliferant while still retaining the characters of its ancestry. The believer in parasitism has found it difficult to reconcile his belief with the fact that all daughter tumors resemble in cellular character the normal cells of the organ primarily invaded.

Dr. Smith's explanation is that the stimulus to tumor formation comes from the presence of the parasite in the cell. The relation between host and parasite is a symbiosis, in which the parasite has the advantage. It derives its food from the cell and drives it at a breakneck speed. It does not destroy its host cell, but only stimulates it to an abnormal and often exceedingly rapid division and multiplication. "This stimulus, it would seem, takes place through the following delicate adjustment of opposing forces: Within the host cell the sensitive parasite produces as one of its by-products an acid. As this accumulates it stops the growth of the bacteria and destroys a portion of them, without, however, destroying the host cell. The membranes of these dead bacteria, which have now become permeable, allow the diffusion into the host cell of bacterial endotoxines. The host cell now contains, of abnormal bacterial products, (a) these escaped endotoxines, (b) a certain amount of weak acid (acetic?), (c) some ammonia; and (d) an excess of carbon dioxide. Under the stimulus of one or more of these poisons the nucleus divides by mitosis. In process of division the nuclear membrane dis-

appears and the contents of the nucleus flows out into the cell. The dormant bacteria under the stimulus of this nuclear substance renew their activities in the daughter cells until again inhibited, whereupon the daughter cells divide. By this *rocking balance*, in which first the parasite and then the host cell has the advantage, the tumor develops rapidly and independently of the needs of the plant."

Dr. Smith does not intimate for a moment that he regards the bacterium described as the cause of human cancer, but does believe that the parasite of human cancer has a similar relation to its cell host.

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

Melanotic Sarcomas Resulting from Irritation of Pigmented Skin.

The *Urologic and Cutaneous Review*, in speaking of Gaskill's instructive paper in the *J. A. M. A.*, commends the warning against the irritation from which these cancerous conditions seem to arise. The nevi from which metastasis occurs should not be disturbed unless there is a slight irritation or peripheral extension, or unless some signs of ulceration or degeneration are shown. When this occurs wide he advises deep excision in the hope that it is not too late to prevent extension of the process.

Gilchrist reports one case in which the patient cut off the top with a razor. Other cases have been reported in which metastasis has rapidly followed the use of the x-rays. It cannot be too forcibly borne in mind that any irritation to an apparently benign spot may be the cause of speedy death. Irritation from an ill-fitting shoe, the clothing, a belt, or in fact from any mechanical means on a nevus of this type may be the cause of very rapid dissemination. There are few persons who cannot show on some parts of their bodies at least one mole, and as a rule they are numerous, but fortunately are of a type in which malignant degeneration rarely takes place.

Moles that are the most common, and cause the least trouble, are the light brown ones that have either been present since birth or which in some instances occur during early life. These are soft or firm, of a light or medium shade of brown, with or without elevation; but the type that is irregular in outline, waxy, smooth, frequently with but very little elevation and of a dark, purplish or bluish color should always be regarded with suspicion, especially if so situated that there

is any chafing or irritation. A common situation for this type of nevus is the choroid coat of the eye, the face or extremities.

When these pigmented nevi undergo malignancy they may remain localized like the pigmented rodent ulcer, which is not so very rare. Rapasi says that he has seen a case of the *non-pigmented* variety develop in a few weeks on the side of a healed furuncle, and that the patient was still living twenty-five years after, or they may extend by metastases through the blood stream rarely, more commonly by means of the lymphatics, until all the internal organs are involved and death ensues either from general cachexia or from mechanical means, as the obstruction of a large vessel by an infarct. If the metastasis takes place through the lymph-stream, the enlargement of the neighboring glands may be the first symptom that will direct the patient's attention to the fact that he has something more than a sore on the skin that will not heal.

Great emphasis is laid upon the necessity of extensive operative measures in radical cases of this kind. They are not the ones in which palliative treatment may be resorted to, but let "the healing touch of the therapeutic knife" go deep and far and wide.

STATIC ELECTRICITY.

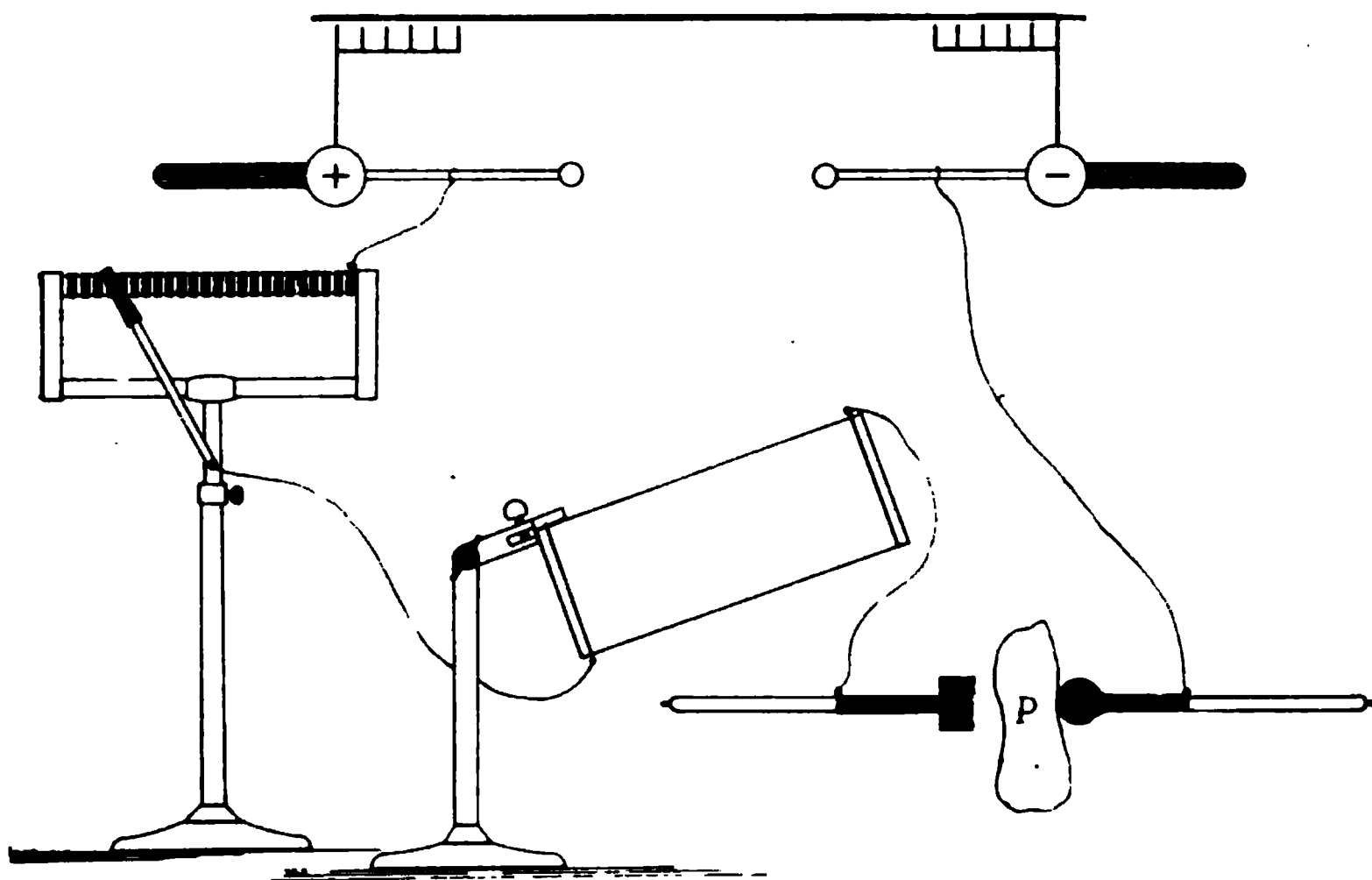
A NEW STATIC MODALITY.

In presenting a new static current and its modality I am mindful of the fact that it may have been thought out and employed by some worker in this field of electrotherapeutics; if so, the writer would be glad to receive for record any such information.

We are all quite familiar with the many uses of the static brush discharge,—both sputtering and blue pencil effleuve,—and of the Oudin spray from the multiple point electrode with their many therapeutic applications, but the modality as shown in the diagram above will give a much more active and generous brush with a definite polarity than any of the usual methods.

The terminal balls of a static machine are separated twelve inches or more and a connecting cord is led from the positive pole to a multiple point spark gap of few or many breaks and then a connecting cord from it to the proximal end of an ordinary solenoid, from the distal end of which solenoid a cord is carried to a multiple point static electrode, held preferably in a

steady stand, capable of adjustability as to distance from the subject, the ideal distance being from two to four inches. From the negative pole a connecting cord is attached to an ordinary large ball static electrode or metal plate which is held in close contact to the opposite side of the part to be treated. The machine is started and run at low speed according to the capacity of apparatus. From the multiple point electrode will be seen to pass to the metal plate or parts interposed an abundant, fine, hot but not unpleasant, static effleuve.



The advantages of this as compared with the direct effleuve or spray without the interposition of the spark gap and solenoid are its increased volume, soft character, greater freedom from sparking, penetrating quality and more intense and lasting hyperaemia produced.

It will be gratifying to the editor of the static department of this journal if those who see fit to employ this seemingly new current will kindly report to him the results of their experience in its use.

E. C. T.

Treatment of Non-Infective Inflammation. Abstract of meeting of the Hunterian Society of London, England.

At a meeting on March 12th, Dr. Andrew Currie, Vice-President, in the chair, Dr. H. Letheby Tidy read a communication on "Myeloblastic Leukaemia," illustrated by micro-

scopic slides. Dr. F. Howard Humphris, in a paper on "Non-Infective Inflammation," and modern electro-therapeutic measures in its treatment, pointed out that stasis in simple inflammation was a bar to complete restitution, and that the indication in almost any stage of inflammatory process was the resolution of the local condition of infiltration; and that when a suitable electric current is used infiltration is dissipated, circulation is restored, and a healthy physiological activity displaces the former pathological torpor. Dr. Humphris pointed out that that form of electricity which stood pre-eminent in producing mechanical effects was static electricity. When administered it induced successive contractions and relaxations, expressing fluid and semi-fluid débris on the mass of tissue involved. Several diseases were instanced, such as prostatitis, synovitis, neuritis, lumbago, and other forms of fibrositis, and the argument was made from the pathology of these conditions, and the mechanical action of the current, that with the removal of the stasis comes the relief of the disease, of which the stasis was either the cause or complicating concomitant. Mr. E. Rock Carling read a paper on "Some Injuries of the Fingers," showing illustrative radiograms.

DIETETICS AND ORTHOPEDICS.

EDITED BY FRANK E. PECKHAM, M.D., PROVIDENCE, R. I.

The Radiotherapeutic Treatment of Sciatica. By Dr. Delherm, Chef du Laboratoire d'Electro-Radiologie de l'Hospital de la Pitié, Paris, and Dr. Eugène Py, Assistant au Laboratoire. *Archives of the Roentgen Ray*, March, 1913.

The authors refer to cases already reported by Babinsky, Freund, Moret, Laquierrière, Loubier, Zimmern and Cottano, and then they present twelve cases of their own, both successful and unsuccessful, all of which were in Babinsky's clinic. They report a series of twelve cases of what they have called sciatica. If case eleven is ruled out because it was Pott's disease and case twelve also ruled out because it was due to the trauma of an injection, there remain ten cases of great interest. In general, all of these cases give the same general picture, that is, pain and tenderness on the sacro-iliac regions, also in the buttock (presumably the sciatic notch), about the knee, about the ankle and in general at the terminal nerve

areas. The spine was deviated *away from* the affected side, and some of them bent forward more or less markedly. This is a picture which is very familiar to the orthopedic surgeon. Medical treatment was employed, also galvanism, the actual cautery, etc., but finally exposure to the x-ray was instituted every other day, when apparently they responded very readily with one or two exceptions. In one case the pain ceased *suddenly* and the patient was cured. One could almost imagine the bone snapping back into position. This method of treatment offers a field for speculation as to the effect of the x-ray.

Some Common Drugs Often Considered Foods. (An editorial in the late edition of the *Charlotte Medical Journal*.)

The average amount of alcohol that can be absorbed and oxidized by the blood is about two ounces in twenty-four hours. Any amount beyond this, when not oxidized, circulates in the blood and causes the characteristic degenerations in the organs and the nervous system.

The active principles of tea and coffee send more blood to the nervous system with consequent increase of mental and nervous activity and, secondly, the retardation of metabolism. The effect of tea, coffee, and alcohol in excess, is to stop the breaking down of old tissue within the body cells. In tobacco the nicotine increases the blood pressure and lessens communication between the different parts of the body and so causes the irregular action of the cardiac systole known as tobacco heart, and the atrophy of the optic nerve which causes blindness.

Individuality in Regard to Air, Food, and Exercise. By BEVERLY ROBINSON, M.D., New York. *Review of Reviews*, December, 1912.

The author calls attention to the effect of air on different people which does not depend on heat, cold, moisture, or rapid changes. It has been observed that the same place will be considered damp by some and dry by others. The subjective feelings ruled the thought. The warm and dirty air of the crowded city is more salubrious to the middle aged or the old than the air of the country. Individuality is prominent and influential.

Regarding food, some people can eat largely and variously at meals and seem well, while others eat only a few things and are equally well.

Regarding exercises, certain are dependent upon a great

deal to keep them in trim. This may be due to the fact that they over eat and thus need to work off the excess.

At one time, and for many months, one can eat and drink certain things without detriment, while at other times they are injurious to health. To a man fagged out with labor and worries, in office work or professional duties, digestion becomes disordered. Send this man on an ocean voyage, or to the mountains, etc., and soon digestion is re-established. The author seems to think that all these things are due to the passing of the family physician and the coming in of the specialists and modern doctors who pander to the moneyed strata of society.

The Fallacy of Testing Food Materials by Animal Inoculation. By. DR. W. T. SEDGWICK, Sc.D. *The Journal of the A. M. A.*, October 26, 1912.

The author in this article condemns the testing of water or food material by animal inoculation. He speaks particularly of testing frozen eggs in this manner. These eggs were condemned by government bacteriologists because they contained large numbers of bacteria or streptococci, and many *B. coli*, also because when the raw melted egg was inoculated into test animals, some of them died, followed by finding *B. enteritis*, *B. pyocyaneus*, *B. alcaligenes*, etc. Man eats these eggs only after they are cooked and does not inoculate himself with them. The results of such inoculations are thus wrongfully compared to the process of digestion. The finding of microbes in the body of animals after inoculation neither proves that they came from the food injected, nor that if it did so come, it would have survived the processes of cooking, digestion, absorption, etc. Finally, there is no proof that, if it had so survived, it would, when administered by the mouth have done any harm.

FRENCH ABSTRACTS.

EDITED BY EDEN V. DELPHY, M. D., NEW YORK.

The Content of Calcium in Elderly People. By Etienne and Robert. (Rev. Med. d'Est., Jan. 25, 1912; *Archives d'Electricite Medicale*, Oct. 10, 1912).

This question interests the electrotherapeutist because it may clear up the pathogenesis of arterio-sclerosis, upon which he must often employ diverse therapeutic measures. The authors refer in the beginning of their work to the disaccord which occurs among workers and writers regarding the con-

tent of calcium in the blood, so that hypercalcaemia in elderly subjects is given as a cause of vascular calcification, but the authors were often not able to determine a difference between them and young subjects. In order to study the subject, the authors have estimated the amount of chalk in the old men in the Hospital of St. Julien. Their conclusions are as follows: The content of chalk in the aged is sufficiently constant in the aged and varies little from that of the adult. If there should be an accidental increase of the chalk, the skeleton attracts it and it is eliminated and thereby the content of the chalk in the blood is kept in equilibrium. When the blood carries considerable of chalk as for example in osteomalacia in the human adult, or in the experimental administration of chloride of calcium to the rabbit, it does not produce atheroma; and finally the authors conclude by this important statement which should be remembered: "Under normal conditions, the content of calcium in the blood does not play a preponderant role in the genesis of atheroma."

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERIC DEKRAFT, M.D.

Pathological Blood Pressure and Its Treatment by Modern Therapeutic Measures. By Francis Howard Humphris, M.D. Abstract of a paper read before the Congress of Physical Therapeutics in Berlin, during Easter week.

The author pointed out the extreme importance of the early recognition and treatment of altered blood pressure, saying how some nervous diseases may be prevented from crossing the border line of insanity, cases of cerebral haemorrhage and certain forms of nephritis placed upon the list of preventable diseases, and if it be true that a "man is as old as his arteries" he can theoretically be kept in a state of juvenescence.

Dr. Humphris made the suggestion that an increased arterial tension is not a necessary concomitant of advancing years, but that it is due rather to an accompanying pathological and remedial condition.

To keep youthful one cannot, as Oliver Wendell Holmes suggested, choose one's ancestors one hundred years before one is born, but it is possible to ascertain what is one's blood pressure, and if it shows a tendency to rise, it is equally possible to correct this with electrical treatment and to take precautions against any recurring cause.

Dr. Humphris uses D'Arsonvalization with the autocondensation couch, and a current of 1000 ma. to 2000 ma., and

even more. A fall in the sphygmomanometric reading may be expected after each treatment of 10 to 20 m.m.

The ordinary current of D'Arsonval is used from a 12-inch coil, a gas mercury break, oil condensers, and a multiple spark gap (designed by Dr. de Kraft, of New York). This latter is very effectual, though simple in construction, having nine small spark gaps, each measuring 2 cm., and the sparks are discharged unmuffled in the open air. The greater number of sparks increases the rate of oscillations in the spiral and the efficiency of the current.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

America's Right to Priority in X-ray Treatment of Fibroids.

The following letter received from Dr. William H. Dieffenbach still further confirms the statement contained in a recent number of the JOURNAL, concerning the priority in use of x-ray in treatment of fibroids to American observers:

MARCH 17, 1913.

Dear Dr. Snow:

In connection with the claim for priority in the treatment of fibroids of the uterus with Roentgen ray, I desire to submit to you the following article taken from my files. Upon perusal of same you will note that I treated a case of fibroids Feb. 25, 1904. This patient remains well to this day, and with the exception of teleangectasis over the abdominal wall has not had any evidence of disease since the treatment. America can claim priority in above condition, as Dr. Hett's case and my own case antedate Dr. Albert Schwenberg's by many months.

Trusting that you can find space to publish these facts.

Very truly yours,

W. H. DIEFFENBACH.

William H. Dieffenbach. Extract from *North American Journal of Homoeopathy*, October, 1904.

September ADVANCED THERAPEUTICS contains an article by J. Hett, M.D., entitled "The Complete Absorption of a Large Uterine Fibroid by x-ray," in which the author claims an apparent cure of a large intramural fibroid by means of x-radiation. His technic was as follows:

"The abdomen and chest were well protected with sheets of lead and the opening for the rays was covered with celluloid.

Vaseline was also applied freely to the abdomen for protection against a burn.

"Daily treatments were given through the abdominal walls until a slight dermatitis showed itself on the twenty-third day and then a ten days' interval was given, when the redness of the skin disappeared. Ten treatments more were given and the patient advised to return home and await results.

"A hard tube was used, excited by a 16-plate Wimshurst static machine, about 15 inches distant, with 15 minute exposures.

"At the end of the treatment no diminution of the growth was noted; only a very slight browning of the skin. The hemorrhages, however, ceased and there was less pain. After a few weeks, during which patient developed x-ray dermatitis, an examination showed disappearance of the entire tumor and entire cessation of hemorrhages. We quote this article in extenso for the reason that during the past year we had a similar experience, the details of which follow.

"We have hesitated about writing or speaking of the subject before, but as Dr. Hett's case corroborates our experience, we feel that the matter should receive due publicity and other x-ray workers be stimulated to test the treatment when advisable. Both cases, it is true, may prove to have been exceptional, but test by others will soon prove or disprove this assumption.

"Case of Mrs. H., aet. 36. Called on recommendation of a friend to be examined for abdominal distress and frequent uterine hemorrhages. Examination revealed one large intramural fibroid near the right fundus fully as large as an orange, and several smaller rounded protuberances to the left of the cervix. Patient was otherwise in excellent health, and we promptly advised surgical removal of the uterus, pointing out the comparative low mortality of these operations if performed in time. The patient's reply was: 'Doctor, my dearest friend died under the knife, and I refuse to be operated. I came to you to be treated by the x-ray, and want you to do what you can for me.' Patient was advised that no case had as yet been reported to our knowledge in which fibroids had shown shrinkage under x-ray, and that no literature could be found on the subject.

"Theoretically we thought that the growths might be affected, but we had no facts to go by. We distinctly insisted that if no improvement was secured within a reasonable time patient would be discharged unless she would submit to surgical measures. Treatment was commenced Feb. 25, 1904, a high tube being employed three inches from the tissues, treatment lasting ten minutes, the treatment being given with the patient in a recumbent position, three times a week. During the middle of March radio-dermatitis of a mild degree

occurred, and patient was given a vacation of two weeks. When she returned she notified us that her monthly period had been less profuse than usual, and expressed her determination to continue treatment in spite of the fact that digital examinations showed no change in the size of the fibroids. We again resumed during April and May. In June radio-dermatitis again supervened, and a vacation of three weeks was given until all active hyperemia had ceased. During July and August the uterine hemorrhages entirely ceased, and an examination of the uterus showed entire disappearance of the large fibroid on the right side and evident clearing up of the nodules near the cervix, the uterus itself being seemingly smaller. A second examination instituted about September 1st corroborated the previous examination. Patient at present writing is under surveillance and will come in monthly for examination, her general health being excellent in every respect. The last monthly period lasted three days with very moderate uterine discharge.

"We trust that the *North American* readers who use radio-therapy will, in suitable cases, test the effect of this new agent in fibroids and report their cases. The limitations of this wonderful power can only be gauged by its failures, and we need corroborative evidence of its value in fibroids before recommending it without qualification in their treatment."



The Journal of **Advanced Therapeutics**

VOL. XXXI.

JUNE, 1913.

No. 6

Edited by DR. WILLIAM BENHAM SNOW

Associate Editor DR. ARNOLD SNOW

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AUTO-CONDENSATION FOR THE TREATMENT OF HIGH BLOOD PRESSURE.

It is unfortunate that the professional mind is so prone to an attitude of ultra-conservatism, instead of awakening to the possibilities of the modern physical management of hypertension and arteriosclerosis.

It cannot longer be said truthfully that there is nothing to be done for arteriosclerosis and hypertension, nor that blood pressure is compensatory to the full extent of the pressure found in a given case of arteriosclerosis. Much of the medical literature of the present day is confusing to the student, who finds various views expressed on the treatment and management of arteriosclerosis.

Some authors who consider the various drug means of lowering blood pressure, finally conclude that there is little to be expected from medicinal treatment, more than temporary lowering of pressure by the use of amyl nitrate or nitro-glycerine. The views with reference to the effects of iodide of potash, based upon the general theory, that it will promote the absorption of calcareous deposits in the tissues, is fallacious. Such occurrence is impossible, because the calcareous condition is present as the final stage of degeneration, the result undoubtedly of hypertension. How, then, can anyone promise to cure, or expect to cure, or promote absorption of the fixed products of degeneration with drugs or anything else? The fact that drugs in the treatment of arteriosclerosis have failed probably explains the two diverse views dominating many minds, viz: (1) that there is nothing to do, or (2) that no treatment is

indicated. How different are such attitudes from that derived from the results obtained by the intelligent employment of the high frequency current.

Those who have during the last decade carefully studied the employment of electricity in the treatment of high blood pressure are prepared to-day to assert with confidence that there need no longer be any question as to its place in the management of hypertension and arteriosclerosis. In cases that are discovered in the progressive stage of the trouble before structural changes take place the further progress of the trouble may undoubtedly be checked, and delayed indefinitely and the pressure be maintained at approximately normal, if together with auto-condensation the patient's habits of life and diet are corrected.

There are three indications, in all cases of hypertension, not associated with nephritis: (1) the correction of diet, limiting the nitrogenous intake to the demands of economy; (2) the correction of any impairment in the function of the liver, by which intestinal poisons are rendered innocuous, and (3) the maintenance of normal evacuation of the alimentary canal. The researches that have been made to the present time indicate that it is the retained poisons, the products of intestinal putrefaction and fermentation, that are the exciting cause of hypertension, and that the principal function of the liver is the conversion of these toxic poisons into innocuous bodies, which must be recognized in the management of every case of hypertension.

There are two methods of disengorging and rendering active the functions of the liver, one at least of which, in the writer's judgment, should be employed in the treatment of the hypertension, viz: application of the static wave current through a flat metal electrode applied directly over the liver, employing a slow discharging spark gap just short of producing discomfort; or the use of the direct d'Arsonval current, passing a current through two large flat metal electrodes producing as great a degree of heat as can be well tolerated directly through the liver, placing one electrode directly opposite the other. Either of these methods tend to promote the removal of engorgement, and to restore functional activity to the liver.

These methods, therefore, justly occupy a place in the treatment of all cases of hypertension, the former as soon as the

pressure is reduced to 160 millimeters, which precludes all possibility of any excessive rise in tension by the employment of the wave current, and the latter which will not raise the arterial tension from the outset of treatment.

It is a well established fact, in the minds and experience of all who are familiar with the use of the auto-condensation method of treating hypertension, that that method is indicated in all other cases, including cases of interstitial nephritis, except that it should never be used in cases of parenchymatous nephritis, and is not of advantage in those cases of hypertension associated with splanchnic dilatation, indicated by the higher tension in which the pressure is compensatory, and pulse higher when reclining than when sitting, under which condition the tension is also compensatory.

The notion in the minds of some members of the profession, that hypertension is always compensatory, is a fallacy, as is easily demonstrated in the management of these cases. Given a case of hypertension, even where apoplexy has preceded, and a pressure of 214 mm. is present as an example. Daily administrations of auto-condensation, employing 500 to 700 milliamperes of current, as indicated by the hot wire meter, for twelve minutes daily will be followed by a steady fall of pressure from day to day until a point is reached at which each day the pressure will be the same before and after treatment as on the preceding day. This will be the compensation point. Here, as in other cases, nature asserts her demands, and requires the pressure to remain constant at a point not lower than the compensation point. This point will be found, in all except very advanced cases, to be from 50 to 70 mm. below the high pressure point, when the patient first comes under observation, and can be maintained at such safe tension by careful regulation of diet and occasional treatment. The patient will feel great relief from the diminished labor of the heart, and lessened sensations of throbbing and discomfort in the head, but also a mental relief from the impending danger of apoplexy.

These results are remarkably uniform and command attention and acknowledgment of the medical profession, lengthening span of life at a time when a man in his old age or ripe manhood can enjoy the fruits of his labors.

SIGNS OF AWAKENING OF THE EDITOR OF THE
OFFICIAL ORGAN OF THE AMERICAN
MEDICAL ASSOCIATION.

We note with satisfaction an awakening of the editor of the *Journal of the American Medical Association*. He is at last ready to concede the thermic effects of the high frequency current, and quotes as authorities men relatively unknown to the electro-therapeutic world. He continues, however, to insinuate that the attitude of those who have accomplished things with physical measures is unscientific.

Translations from foreign journals have, from time to time, appeared in that journal concerning the use of the x-ray in the treatment of prostatitis, in which it is least valuable, and also on the treatment of fibroid tumors, for which it is proving itself more than a peer to surgery. Nothing appears, however, in the official organ of abstracts from American journals on papers devoted to electro or physical therapeutics. This is very apparent to those who are looking for fair play.

It is high time that men who pass as scientific spokesmen for the American Medical Association should make some honest researches into the real truth of these subjects, and not habitually neglect consideration of matters which are of more interest to the profession and of more benefit to humanity than many other things which are treated at great length. It is unfortunate that a journal which stands to represent the real status of all medical subjects should not be progressive, but so narrow that by the course taken it continues to mislead a large number of readers who have a right to be enlightened.

Why is it that the medical profession in the great cities are complaining of want of patronage? Why is it that we are frequently approached by medical men in general practice with the statement that "there is no living for a general practitioner in large cities except for the favored few who chance to occupy a position in a favored circle?" Why is it that the laymen are going in large numbers to irregulars who seem to give them greater relief and satisfaction than the general practitioner, who relies upon drugs and surgery? Why is it that the laymen are becoming wary of the surgeon's knife, and are hypercritical of his methods? Why is it that the men

who are using physical therapeutics scientifically have universally a large following and clientele while their neighbors are complaining?

Do not say of the latter that it is not because they actually make good, and thereby impeach the intelligence of a very investigating class of citizens. There is something materially wrong in the narrow teachings and in the following of such leaders as the editorial staff of the official organ of the American Medical Association.

Investigation is challenged by those who know before statements are made that what is taught by those enlightened in the department of physical-therapeutics are misrepresentations. Give them an opportunity to demonstrate the truth of their claims, and opposition will cease. The members of the profession who are gradually investigating these subjects are becoming more and more convinced of their truth, because they succeed in effecting results in the relief of a large number of conditions absolutely not amenable to relief by the methods generally employed by those not informed, which is all the argument that is required to justify what has here been said.

A charge of laxity to ethics cannot often be made against the electro-therapeutist who is a physician. There is no association of men in the medical profession that are more ethical and more scientific in what they do and claim than the members of the American Electro-Therapeutic Association.

For the good of humanity and in justice to truth, proper recognition must very soon be accorded these important subjects, not only by the editorial staff of the journal mentioned,—but by the teachers of the recognized medical schools.

ELECTRO-THERAPEUTICS IN NASO-PHARYNGEAL AFFECTIONS.***BY F. C. TICE, M.D., RICHMOND, VA.**

The attendance and conduct of all our meetings has been marked by three great features standing out in bold relief: the intense interest of all present in the special work in which we are engaged, the enthusiastic pursuit of a wider and fuller scientific comprehension by which to carry out successfully the possibilities for good presented, and the spontaneity with which acquired knowledge is shared with all.

It is in recognition of these facts, and with an earnest desire to help in the broadening of the work that I call to your attention the possibilities of our methods in affections of the upper air passages and their contiguous parts.

The physiological and the therapeutic action of the high-frequency current is familiar to all, but we do not seem to be fully agreed as to the modifications of its effect when used through the medium of the high-frequency, or vacuum, tubes of varying degrees of vacuum; yet, recognizing that colors are different rates of vibration, that the rate of vibration governs the effect, that light occupies an invaluable role in the cure of disease, and that the color of that light is a very important factor, it is rational to believe that the degree of vacuum in a tube has a direct bearing on the result achieved. In practice, this seems to be borne out. My own experience prompts me to use the red, or lilac, tubes in acute congestions, and the higher colors in chronic states. The effect of the high-frequency current in relieving stasis, in promoting dissolution and absorption of adventitious growth, not only of the soft tissue, but also exostoses, is markedly shown in the affections under consideration, while its germicidal action is really marvellous, and, to many, incredible. Under its intelligent use, nasal obstructions are dissipated, eustachian tubes reopened, hypertrophied tonsils resolved, irritative cough abolished, catarrhal discharges corrected, and the special senses of smell, taste and hearing restored. In some instances, the progress toward recovery may be materially advanced by appropriate synergistic measures. This is particularly true when

* Read on September 5, 1912, before the twenty-second annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

there is laryngeal involvement, where the use of the steam atomizer or of the ice pack, or of both, will prove markedly beneficial.

That in every case of departure from the normal there exists a neurotic element will admit of no contravention. In no diseased conditions is the recognition and diagnosis of the neurotic element of greater importance than here. To treat, therefore, any such local manifestations without first ascertaining the general and special presentments as to the various organs and functions is, to say the least, unscientific, while it at the same time courts failure. The special senses of sight, hearing, smell and taste may one or all be involved, and their peculiar sympathy with other parts of the body should be understood and taken duly into account, as a reflex irritation elsewhere may be the means of lowering local resistance and thus constitute the remote cause. That is to say, a local manifestation here may be in itself an indication of an abnormal state in some part or parts far removed anatomically, yet in peculiarly close sympathy physiologically. Neither should the mental state be ignored, for it is often an important factor.

Among the most common of the reflex phenomena are the so-called liver cough, ear cough, the muscular ocular spasm, weak eyes, and those nasal congestions and fluxes due to pelvic disturbances and to abnormalities of the organs of reproduction. But there are numerous other and finer manifestations along these lines which will tax the skill and the intelligence of the physician to ferret out and remove.

Having grasped the situation, we use locally tubes insulated according to the method devised originally by Dr. Snow, and variously modified by others from time to time to adapt them to special needs and individual conceptions. The tendency to use strong currents should be avoided—twenty-five to fifty milliamperes to any mucous membrane being quite effective, while a too high amperage may defeat the end desired. The spark gap should be smaller. Applications within the nostrils should not exceed in duration fifteen minutes. In acute conditions a treatment of five minutes' duration is very salutary. In proliferations and exostoses, the bipolar method, using a surface electrode of suitable size and shape as nearly as possible directly opposite the internal electrode, will give the best results. Here stronger currents are called for: seventy-five

to one hundred and twenty-five milliamperes for from two to five minutes.

In atrophic conditions, much of benefit may be achieved by intermitting the flow of current so as to produce stimulating impulses. This is very satisfactorily accomplished with accurate adjustment and regulation of the impulses, both as to their frequency and duration, by the interposition of the flasher devised by Dr. Finley R. Cook, which has proven of so much value in the treatment of other affections.

Contrary to some preconceived opinions, sparking within the nose should be avoided, as it is usually very painful, and its efficacy open to grave doubt. The nostrils should be first sprayed with some bland oil and the electrode anointed with sterile vaseline. In tonsilitis, acute or chronic, the tube should be wholly insulated, except on its contact surface. In cases of catarrhal occlusion of the eustachian tube, the spray should be followed by the application of the insulated nasal electrode through the nostril and over the mouth of the affected tube for ten minutes, and an external surface application made under the angle of the jaw for the same period.

In disease of the antrum, or of the frontal sinus, the high frequency should be supplemented with the x-ray and light. In otitis media and mastoiditis, light is used alternately with the x-ray, daily treatments being given, or two daily in urgent cases, and high frequency availed of when indicated. It has been my good fortune to have been able to permanently relieve critical cases of mastoid infection, with or without puncture of the membrani tympani for drainage, p.r.n., and to materially relieve some grave cases in which the ultimate result of prospective operative interference was problematic. These results, with those hitherto reported by others, justify the declaration that operative procedure in these cases is not warranted until after a fair trial of the methods of electrotherapeutics, when such are available.

The laryngeal spasm of whooping cough, the infection itself, and the accompanying bronchitis, may be, and have been, promptly relieved by means of light and high frequency. The coryza and other symptoms of suppressed measles have been relieved by the same means, with complete recovery in seven days. Diphtheritic membrane yields rapidly under the high-frequency current, and it is my belief that by its use the

course of the disease is favorably modified. Follicular tonsilitis has been absolutely cured in four treatments. Among my records is a case in which a patient with anosmia and inability to breathe through the nose for eighteen years had his disability removed and the special senses of taste and smell restored. Many cases of impaired hearing have been relieved, abnormal vision corrected, and, with it all, a general and decided improvement in bodily health.

As to the intervals between treatments, personal experience has led to the conviction that in either acute or chronic conditions a given number of consecutive daily administrations will accomplish better results than three or four times that number at intervals of from forty-eight to seventy-two hours. In some instances, as already stated, two seances daily may for a time be indicated. Acute rhinitis, including simple cases of hay fever, and other acute conditions, are frequently relieved by one treatment, while others of varying degree may require from two to eight times that number. Complicated cases will naturally demand a longer time and are subject to the alleviation of the co-existing conditions. Chronic states require from three weeks to three months continuous treatment, with the result—not sometimes—but always, that not only is the local trouble relieved, but the general health is better than for years. This matter of improvement in the general well-being, following local treatments, is a constant phenomenon and the subject of gratified comment by the recipients. One lady assured me that she was recommending these methods to her friends for the complexion and as a beautifier.

A very important and, indeed, essential factor is that during the treatment the patient be insulated. This may be accomplished with an ordinary wooden chair, the patient's feet resting on a hassock.

With the local measures noted, and while giving them due attention, we must invariably, in conjunction with them, direct our earnest efforts to the relief of any and all co-existing pathological conditions. If we do this intelligently, success will be achieved and we shall realize that we have labored not alone to the relief of the weary and the heavily laden, or to our own emolument, but also to the glory of God and to the advancement and honor of our beloved and fascinating specialty.

709 South Jefferson Street.

Discussion.

Dr. William Benham Snow, of New York: I would like to ask two questions, whether his dosage was toleration, and in which cases he used the high frequency and which the static machine?

Dr. Tice: All these cases were treated from a transformer, and the dosage ranged from twenty-five to fifty milliamperes in the nasal cases, with a small spark gap. I find that if I use a hot current it is detrimental.

Dr. M. G. Campbell, of Atlanta, Ga.: I had another experience with reference to the use of high frequency in the treatment of ulcer of the nose. This patient was sent to me by a specialist on eye, ear, nose and throat troubles. He had treated this ulcer for months without any effect on it, the patient growing worse. He sent the patient to me, and I used the highest high frequency on the No. 4 Victor, producing no sensation at all to the patient. The patient seemed to be very sensitive to electricity. He was a doctor himself and would not stand hardly anything, so I had to be very particular about it. I used this high frequency in his nose from five to seven minutes as often as I could get him to come. An acute trouble had gone through the nose and was appearing on the outside of the nose, inflaming the skin. I used this current over this part also for five minutes, and the other within the nose for five minutes. I had him report to the nose specialist every few days to see the effect of it, and at the end of a month the specialist reported to me that the ulcer had healed entirely. I could see from the outside that the inflammation of the nose had subsided. This nose specialist reported to me his experience in reference to an ulcer of the nose in a patient that he had to use all kinds of things on in order to relieve it. Knowing my experience with this patient, he borrowed a high frequency outfit from one of his friends and used it in the nose on the ulcer, and he reports to me that he healed it.

Dr. William Benham Snow: I think that it is only justice to Dr. Tice that we should discuss his paper, because it represents so much experience and study. His treatment of hay fever, given us in 1910, by first spraying with a combination of oil of pine needles and other simple oils, and then applying the high frequency current, is remarkable in its results in

such cases. Last year in six cases treated I was absolutely successful in five. Two of them who had suffered for more than two years were relieved in a very few days, and went through the rest of the season without any trouble. I use the spray first and then the high frequency Oudin or direct d'Arsonval current, with a flat nasal vacuum electrode held first in one side of the nostril for ten minutes and then in the other. The results are really gratifying and valuable as a clinical experience. We do not think that all these cases are due alone to irritation of the nerve endings. It seems, however, to allay the local sensitiveness to the ragweed.

With reference to the value of x-ray flashes, I have used them, but have not become impressed with them. I have often wondered whether the reports as to their value are correct. I think very often there is too much said with reference to things that have not been sufficiently investigated and verified by the experience of more than a few observers.

Dr. Frederick M. Law, of New York: Dr. Snow's remarks brought to my mind a little use that I have for the vacuum electrode in the nose. I do nose and throat work, and I always have been opposed to the use of adrenalin in the nose previous to an operation. The danger of secondary hemorrhage is altogether too great. What I do use is a vacuum electrode excited from the negative pole of a static machine. Apply cocain in the nose about fifteen minutes before the operation, leaving it there for ten minutes. Then if you look in the nose you will find that there has been a slight contraction of the membrane. Then put in the vacuum electrode and use a very mild current from the negative pole for five or six minutes, and you will find that the membrane on the turbinates has contracted almost to the bone itself, which is more than adrenalin would accomplish and the contraction will last longer than that from adrenalin; besides there is no danger of secondary hemorrhage. I invariably employ it before an operation on the nose.

Dr. Pfahler: How long does the effect last?

Dr. Law: That is hard to say, for the reason that you do the operation, pack the wound, and the patient goes away. But the field of operation in a sub-mucous resection is clearer than with adrenalin and one application is sufficient, while adrenalin has to be applied more than once.

As far as Dr. Cook's treatment is concerned, I tried it and I found no result whatever. The only case in which I got any benefit was in a case of detached retina. It improved, but whether it would have improved—as they sometimes do—without treatment I do not know.

Dr. G. E. Pfahler, of Philadelphia: I used such an outfit as recommended by Dr. Cook for flashing x-ray, so to speak, both at the hospital and at the office. I have discarded both as useless and worthless. I never did have any confidence in it, but I felt that it ought to be investigated. I made a number of tests, and it is absolutely worthless, except in so far as the actual time that the rays are passing through the patient.

Dr. Charles F. Mills, of New York: I am indebted to Dr. Tice for his paper last year in regard to some suggestions made about nasal conditions. I imitated his method as well as I could on the static machine, using a bland oil.

By connecting a flat nasal electrode with the positive side of the machine (a ten plate machine running very slowly) I can get a spark one-third of an inch long, until it produces a throbbing in the nerves of the teeth. It has been a surprise to me the amount of opening this produces in the tissues of the nose, in either acute or chronic congested conditions of the lining membranes.

Dr. Snow: It is remarkable how you can drain the tissues of nasal passages in the way described by Dr. Mills.

Dr. Tice, in closing, said: " Dr. Snow will accept my thanks for his action during my absence from the session. Referring to his favorable experience in the treatment of hay fever, I am pleased to state that since treating my first case, in June, 1910, by the method reported to this Association the following September, I have had no case of complete failure, and but one of only partial relief. In the latter there existed chronic ovaritis with endometritis, as well as an old, eburnated, resistant bony growth of large size on the outer wall of the right nostril, which yielded but partially to treatment. I do not consider that the oil spray is essential as positive results may be obtained without it, but it is a desirable adjunct.

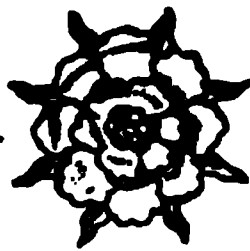
"The result obtained by Dr. Campbell in nasal ulcer is in line with my own experience. All ulcerations of mucous

membrane, including deep and extensive rectal lesions, are readily cured by this means, as they respond wonderfully to high frequency applications.

"Concerning the statement of Dr. Lewi as to the effect on the nasal mucosa and the question of Dr. Pfahler as to its persistence, the shortest period noted by me in acute cases has been six hours.

"As to the flasher used in connection with the high frequency current, I not only get more speedy results with it in chronic cases, but the patients note favorably the difference between it and the continuous application. With its use in x-ray work I have had less experience, yet such as I have had will cause me to resort to it when indicated.

"Thanking Dr. Mills for his courteous acknowledgment, I would state that my only objection to the use of the static machine in nasal work is the difficulty in so regulating the spark as to get a smooth current, the effect, with a minimum spark gap, being practically identical with that of the coil."



GOUT.*

BY HENRY W. FRAUENTHAL, M.D.,

Physician and Surgeon-in-Chief of the Hospital for Deformities and Joint Diseases.

The cause of Gout has not yet been positively ascertained, for there is still a doubt as to whether it is due to the defective elimination of the urates themselves, or, on the other hand, whether it is a disturbance of the purin bodies, which will later result in the formation of combination of urates. The clinical entity called Gout is brought about by the sodium biurate and other imperfect combinations of uric acid deposited in the tissues. I might also add that crystals of sodium biurate have been found by Watson, Gairdner and Dafour on the cerebral meninges, by Schroeder van der Kolk in the neurilemma of peripheral nerves, and by Cornil in the cerebro-spinal fluid.

Uric Acid Not a Poison.—Sir William Roberts states that it is difficult to believe that uric acid contains a poisonous action for the following two reasons:

(1) That there is no direct experimental proof that uric acid is a toxic agent.

(2) That a gouty person shows no signs of poisoning until the sudden arthritic attack, although the fluids of the body are charged with sodium biurates to saturation.

Necrotic Changes in the Affected Tissues Regarded as the Primary Cause of Gout, the Necrosis Being Due to the Presence of Dissolved Urates.—Ebstein, who has spent much time in this subject, is the great advocate with regard to this statement. He declares that a destructive or a necrotising process is produced in the cartilages or other involved tissues by uric acid in one form of combination, and that following this the uric acid in another form of combination is deposited in the necrosed areas. In other words, a destructive process always precedes the process of deposition, both being due to uric acid, but in different states of combination. He also states that uratic crystals are found in necrotic tissues only, and

*Read at the meeting of the Electrical Therapeutical Society, Richmond, Va., September 4th, 1912.

never in healthy ones. Therefore he considers the necrosis of tissue, together with the subsequent uratic deposit as the causes of Gout.

Ebstein's Views as to Necrotic Changes in Gout.—Ebstein is convinced that it is only in tissues that have undergone necrotic changes that crystalline urates are deposited, for by dissolving out crystalline urates from tissues in which they are deposited he can show the presence of necrosis in places which formerly contained uratic deposit. Nevertheless, such prominent writers as Sir Alfred Garrod, Sir William Roberts, Sir Dyce Duckworth, Cornil and Ranivier differ in this respect. The changes that can be seen in cartilages containing deposit of sodium biurates are quite evident, assuming that they are brought about partly by the mechanical pressure of the crystals, and partly by the inflammation and subsequent degeneration set up by the presence of the crystalline deposit.

Nervous Disturbance Regarded as the Primary Cause of Gout.—Cullen considered that nervous disturbance is the cause of gout. Sir Dyce Duckworth, although of the opinion that Gout is caused by excess of uric acid, also states that it is the result of a special disturbance of the nervous system, and that the specially involved part is established in the medulla oblongata, where there is likely to be a trophic center for the joints.

Sir Dyce Duckworth states that the suddenness of an attack of Gout is generally due to a nervous condition, and that the discovery of the symptoms is the result of the instability and undue sensitiveness of the nervous system.

Dr. Ralfe claims that the excess of uric acid in blood in gout was caused by non-conversion into urea of the uric acid and normally formed in the tissues, and furthermore, it is his opinion that a disturbance of innervation had prevented the normal destruction of uric acid in the tissue.

Cause of the Presence of Uric Acid in the Blood of Gout.—It is now to be determined whether the excess of uric acid present as quadriurate and biurate in the blood in Gout is the result of imperfect excretion of over-production or deficient destruction. It is the unanimous opinion of all observers that in the blood of Gout there is always an excess of uric acid in the form of one or other of its salts. The following are the causes for the enormous amount of uric acid:

- (1) Normal production with defective excretion of uric acid.
- (2) Over-production and normal excretion of uric acid.
- (3) Diminished destruction of uric acid by imperfect oxidation or by some other means.

It is the belief of many observers that the place in which uric acid is formed differs in Gout, and it is in these blood disturbances that uric acid occurs in the blood without the development of Gout.

All the uric acid contained in the blood in gout comes direct from the kidneys, which is due to some condition of the organ, which prevents the proper excretion of the uric acid formed in the kidneys.

Reasons for Belief in the Renal Origin of Gout.—The following reasons support the fact that gout is caused by a kidney disturbance:

- (1) In cases of kidney disease, uric acid has always been found in the blood.

- (2) Uratic deposits are occasionally found in joints of persons afflicted with renal disease, but who have never suffered from Gout.

- (3) In autopsy examinations of gouty persons there is always some kidney disturbance observed.

- (4) Certain toxic agents predispose to both kidney disorder and Gout.

It is to this affection of kidneys in gout that the latter is an inheritance. This is often caused by excessive indulgence in nitrogenous foods, wines and beers, the toxic effect of lead and of nervous impulses, such as shocks, accidents, etc.

Uric Acid the Result of Diminished Oxidation and the Result of Animal Diet.—It is also believed that the origin of uric acid results from a less perfect oxidation of the nitrogenous constituents of the tissues which occurs when urea is formed. According to this view, urea is the ultimate product of the metabolism of nitrogenized tissues in mammals, whereas the formation of uric acid is considered as occupying an intermediate stage in the metabolism of nitrogenized tissues. In birds and serpents it has been supposed that the nitrogen is eliminated in the form of ammonium quadriurate without having undergone the further change in the urea. This fact is mainly based on the observation of the two following facts:

(1) That uric acid by being combined with oxygen can be split up into urea and other substances.

(2) That the kidneys excrete uric acid to the entire exclusion of urea in reptiles whose respiration is faint and whose temperature is low.

The excess of uric acid is also caused by too highly nitrogenized diet, particularly an animal one. Virchow, however, does not agree with this statement, as he has often found gouty subjects poorly fed.

It is also caused by a vegetable diet, which has been observed in birds who live on grain exclusively, and about whose joints uratic deposits have been found.

Anatomical Seat of the Deposit in Cartilages.—The uratic deposit first occurs in the central portion of articular cartilage, a point farthest from the net work of nutrient capillaries, and a point whose nutrition is more easily retarded. It is also probably the point of greatest pressure, hence a long walk, a dance, or similar violent exercises may precipitate an attack of gout. Uratic deposits occur in cartilages, ligaments, synovial membranes and their fringe-like processes. In synovial membranes the deposit is not on the surface, but in the subserous tissue. Ebstein states that directly under the surface of the cartilage a very shallow tissue layer exists in which crystals are most plentiful. He agrees with Sir Alfred Garrod that only two-thirds of the thickness of the cartilage is usually infiltrated, although exceptionally, as shown by Cornil and Ranivier, the whole cartilage may be infiltrated. With regard to the exact relation of the uratic deposit to the various elements of articular cartilage, the cartilage cells are held to be the centers of primary deposit by Cornil, Ranivier, Charcot, Rindfleisch, Budd and Garrod. Cornil and Ranivier consider that nutritive disturbances in the cartilage cells precede the deposition of sodium urate. Rindfleisch and Budd, however, consider that the cartilage cells do not take any active part. Some observers, including Sir Dyce Duckworth, consider that the deposition occurs quite indiscriminately in selecting for its original site any particular element of the cartilage. Others, as Bramson, Rokitansky and Augusta Foerster, think that urates deposit in the intercellular cartilaginous substances.

I can present a method of treatment which yields results in the acute and painful stage of gout, and that is by direct

phoresis of fluid extract colchicum to the acutely inflamed painful joint in place of through the medium of constitutional treatment.

The internal administration of colchicum does not change the quantity of urea eliminated, and there is a decrease in the excretion of uric acid. Some observers regard the effect of the drug only by its action as a cardiac depressant.

This in no way explains the relief of pain and the subsistence of symptoms when colchicum is administered, neither can I add any light on the rapid relief of the symptoms, when we carry in our mind the joint pathology. For a period of fifteen years I have given to patients in an acute attack of gout, involving the smaller joints or the knee, treatment which consists of applying sponge electrode saturated with the fluid extract colchicum (Squibb), attached to a galvanic, reversing the current every two minutes, using the current of a strength up to the patient's point of tolerance of pain. Three treatments in thirty-six hours would relieve all the acute symptoms of pain, swelling, etc.

Although I have the honor of being a professional chemist, I cannot explain what might be the nature of the alkaloid introduced and carried in by the electrical action, or what combination with the sodium biurate and other salts results in the relief of pain and the subsistence of symptoms, although I have a record of over 300 cases treated by this method.

I will cite a few cases to demonstrate an empirical fact not explainable, either with my knowledge of chemistry or electricity:

Colonel F.—I am citing this case because in the past four years he has been treated on at least eleven different occasions. The attack of gout in this case involved the big toe and ankle joint. His feet swelled to almost twice their normal size, and on some occasions he visited the office with crutches, or assisted himself with a cane. Treatment with cataphoresis lasted about seven or eight minutes, and was repeated about three times in thirty-six hours; all pain, redness and swelling disappeared.

F. V. W.—Manager of one of our largest hotels, whom I saw in consultation on April 16th, 1909, was confined to bed after an acute attack of gout involving the right big toe. In all previous attacks he had been in bed from two to three

weeks, and reconciled himself to remain that time when I saw him. I informed him that if he would come down on crutches to my office in a cab I would guarantee his relief in three days. He regarded this prognosis as ridiculous, but said that sooner than remain in bed and suffer the agonies of the disease he would take a chance. After the second treatment he was able to put his foot on the ground, and on the third day discarded his crutches and walked about, but persisted in continuing the treatment, in order to prevent a recurrence of the attack, since which time he has been treated for four attacks.

Mrs. H. E.—Patient presented herself with an acute attack of gout in the right hand; all the articulations were red, swollen and painful. She had been treated for previous attacks in her big toe and foot for a period of twenty-five years; in the last few years the case had been under my professional care. The patient was treated at 11:15 A.M., 5:30 P.M., next day at 9:30 A.M., and on returning at 5 P.M. all symptoms had disappeared.

E. M. G.—This patient had been treated for several previous attacks of Gout in his feet, but owing to a pain in his larger joints he concluded that his trouble must be rheumatic, and decided to take the cure at Mt. Clemens, Michigan. After two weeks of baths he developed a very acute pain with swelling and redness in his right arm; he decided to return home, when he made his first visit, at which time his elbow was quite swollen, tender and painful. He was treated ten minutes twice daily, at 10 A.M. and 5 P.M., by the office nurse, and the pain and swelling had disappeared at the fifth treatment.

I am simply citing these cases which represent many, many others, but a repetition of similar descriptions would only add length to the paper and throw no further light on the subject.

I am simply advocating this method as a means of obtaining a quick result, but it in no way need replace any additional treatment, such as active choleagogue cathartics, suitable diet and medication, but by the rapid result the time of illness is materially curtailed.

The reversing of the current prevents the sensation of burning and pain, but has no effect on the introduction of the drug. We must bear in mind that drugs introduced into the jugular vein on one side of the neck can be found in the

blood in the carotid artery on the opposite side in a little over a minute.

We must regard the introduction of organic compound as molecules, not in ions, as the material introduced produce them physiological action, as cocaine compound, adrenaline, fluid extract, colchicum, etc.

The very recent discovery of Dr. Meltger, of the Rockefeller Institute, of an independent circulation in the body in addition to that of arterial nerves and lymphatics, will be a means of the better understanding of this local physiological effect.

The introduction of fluid extract colchicum will produce the relief of symptoms, pain, swelling, etc., while the current applied without the medication does not produce any relief.

The following is the treatment given by Dr. N. S. Finzi, of London, for rheumatism:

Galvanism or Ionization.—This can be obtained either from a battery (primary or secondary), or, when the current is continuous, from the main. It is necessary for efficient treatment to have a shunt resistance, in order that the current may be taken from 0-100 up to the desired strength. With the big currents used in the treatment of the larger joints a series resistance or a cell collector is too painful to be of practical use. If used on a battery the shunt must be provided with an arrangement which automatically cuts it out as soon as the currents to the patient reaches 0. For ionization, a milliammeter is necessary to measure the dose, and must of course be in the circuit to the patient. The electrodes placed on the affected joints consist of thick pads of cotton-wool at least an inch thick, on which is placed a flexible metal electrode, those made of chain-mail or tinsel being the best. The cotton should be at least an inch wider in each direction than the metal electrode. This is bandaged firmly on the joint, after having been soaked in the solution containing the ions it is required to drive in, great care being taken to obtain a firm and even contact. The current is turned on very gradually, and with large electrodes it may attain to 250 milliamperes or more. In treating the knees, it is my rule after the first few applications to get the current up to at least 100, and to average at least 65 in 25 minutes, while most patients get to a maximum of over 150 milliamperes. The current is turned off gradually,

but considerably faster than it was turned on, one minute for 100 milliamperes being a reasonable time. The treatment produces a similar sensation to a mustard poultice, but after the first few doses most patients do not mind it. The ions I almost always use in rheumatism and gout are lithium and iodine, the lithium salt being on the positive pole and the iodide on the negative.

The strength of the solutions containing the ions is immaterial within wide limits, the only necessity being that it must be strong enough to contain the maximum amount of ions; any increase above this is mere waste. One per cent. solutions will be found ample. The other constituent of the salt used does not matter, so long as it is used on the correct pole. Thus, on the positive pole lithium ions will be driven in whether the citrate, the iodide, or the carbonate be used. Lithium iodide has the advantage that it can be used on either pole for iodine and lithium ions, but is expensive.

For hospital work, I treat several patients connected together in series off the same switchboard. The positive pole is connected with one patient and the other electrode on him is negative, and is connected to the positive electrode of a second patient, and so on, the iodine pad on one patient always being connected to the lithium pad on the next.

Discussion.

Dr. G. Betton Massey, of Philadelphia: It was an interesting paper. I am surprised that Dr. Frauenthal called it a paper on ionization. His treatment was the old-fashioned galvanic alternative. There could not be any ionization there. All the electrolysis—anaphoresis or cataphoresis—that was accomplished when the current was turned on by the nurse each time was de-accomplished when she turned it on in the other direction the other two minutes. Anyone who has tried ionization will notice that it is a slow process, and that very little happens in two minutes. You could not get anything through the thickness of the skin in two minutes unless the current was exceedingly strong. It is, however, a very striking result he got, and ought to encourage us to use the galvanic current in these cases of gout.

I wish to utter a word of warning against the use of static electricity in gout. I do not know what results these men are

having who use it every day, but I have been knocked out several times trying to treat gout with some form of static modality.

That is a beautiful description the doctor read of ionization. A description that doesn't tell you the thickness of the pad isn't worth anything. You should have a pad which when wet is at least an inch in thickness. This is simple enough for the nurse to do. You can have a glass tray gotten from a photographer for your cotton to rest upon when you pour your solution upon it. The strength of the solution mentioned is very good. The electro-chemists will tell you that the greatest number of ions occurs in a certain strength of solution. All you have got to know is that it is a weak solution. Just make a preliminary calculation, knowing that as you lose it you can fill up the bottle with just as good results later.

There are one or two little details that I want to go into about holding the electrode in place. These are curved surfaces usually. The plate should be about an inch less in surface than the cotton pad. If you use those fine wires I have advocated you can attach the tinfoil by turning the corner over the wire and hold it in place with a strip of adhesive plaster. That is a technique you can easily teach to your nurse.

Dr. Frederic De Kraft, of New York: Uric acid is seldom found in the blood under normal conditions. It is destroyed almost as quickly as it is formed. It is only under certain conditions where there is an interference with the digestive process or with the liver that the liver fails to convert uric acid into urea, that the uric acid accumulates in the blood. Then it is most apt to be deposited in those parts where the circulation is least abundant. We all know that an attack of gout is very apt to follow an attack of nervous excitement. That nervous excitement may be brought about in a variety of ways. We know how nervous excitement will arrest the digestive processes and how it will arrest the functional activity of the liver, and so on. As a result of that we have this accumulation of uric acid in the blood. As long as it is not deposited somewhere in the cartilages or fibrous structures of the joints or in the skin, by reason of arrest in the circulation—circulatory spasm will do it—there can be no combination with the alkalies of the blood and uric acid will do no harm; but if combination occurs with the sodium of the blood

and sodium biurate crystals are formed, then the crystals act as an irritant, very much like a piece of iron in the eye. It is purely a local irritant, and by reason of that it sets up a further spasm, a further impediment in the circulation, and you get venous stasis, and all those combination of circumstances that bring about the swelling of the joints.

In order to relieve an attack of gout you must reduce the circulatory spasm first. Probably Dr. Frauenthal is doing that with his galvanic current, by reason of the dilating effect it has on the blood vessels. We have been told that the phagocytes of the blood eat up the urate of sodium needles with avidity. Now if we use any means whatsoever to open up the capillaries and allow an increased action by the phagocytes, we get rid of the offending substance. That will soon get rid of the pain.

I have had very many cases of acute gout come to me, and my method of relieving those cases has been the local application of the d'Arsonval current by the bipolar method until I got a thorough dilatation of the blood vessels. Then I follow it usually with the static brush discharge. During the time of the administration of the brush discharge if you watch the patients you can often see them relax as the pain disappears. You can always relieve those cases in the course of half or three-quarters of an hour. I had a gentleman telephone me from Syracuse last winter. While he was in Chicago he had an acute attack of gout in his arm. His wrist and elbow were very badly swollen. He told me he would be in at eight o'clock. The train was late, and he did not come in until eleven o'clock. After using the d'Arsonval current and then the brush discharge, after ten minutes' application of the brush discharge that man went to sleep. He went home and had a splendid night; slept until nine o'clock, took another treatment, and in two days he was fully restored to health. That is simply as a result of dilatation of the blood vessels, which allows the phagocytes to enter to the point where the urate needles are deposited and allows the phagocytes to take hold of them.

Dr. William Benham Snow of New York: Dr. de Kraft has described exactly the local method that I use, except that I use light preceding the direct d'Arsonval current. The direct d'Arsonval current applied to a joint inflammation of that sort acts like magic. Following that the static brush

discharge is applied to dissipate the infiltration present, and the thing is done. The philosophy of the treatment is as Dr. de Kraft has described it. In the management of gouty cases I think we should endeavor to make the result permanent, that the patient would not have to return so often. We should treat the *symptom complex*, as well as the local trouble. The light bath given two or three times weekly to promote elimination by profuse perspiration, and the same days apply the static wave current over the liver, or the direct d'Arsonval current through the liver to restore its function, will accomplish much. In addition correct the diet, denying excessive purins and spirituous liquors. Such management will put the patient, if he complies with directions, in such condition that it will not often return. I fancy in Dr. Frauenthal's case he has attributed too much to his drug. Can he give us the evidence that the drug actually goes in? As Dr. Massey says, when the pole is reversed the thing carried in is carried out. I take it that he introduced it first from one side and then from the other by having the fluid solution on both pads. As a matter of fact, cases of gout should be treated from a broader point of view, looking out to promote the elimination and restore the functions of the liver, when more will be accomplished for these patients than by the local treatment only.

Dr. Walton: Dr. Frauenthal's paper is very interesting, in calling attention to the great value of ionic medication, and he is to be congratulated on his results.

In the class of cases cited by Dr. Frauenthal I use, with very satisfactory results, to increase elimination, which is one of the essentials in the treatment of gouty conditions, the electric light bath and hydrotherapy combined with the local use of dry hot air. By this method of treatment dilation of the capillaries of the whole body is produced, and in addition to rapid elimination the sedative and soothing effects of heat are also obtained.

Dr. Francis B. Bishop, of Washington: For a long time we did not have any d'Arsonval current. We had only the direct current, and we old fellows who have been using these currents for a great many years naturally refer to our past experience, and while they may be able to get a little more decided results and more quickly with d'Arsonval currents, still there are a great many practitioners throughout the country who

haven't the paraphernalia, and we have gout all over the world. It is well, therefore, to go into the treatment by the continuous current. There is no doubt that we do get to-day decided effects from the continuous current. We can produce exactly the same effects Dr. de Kraft speaks of. Take a basin of hot water, put the foot in the basin of hot water, and if you want to produce any cataphoresis or ionization you can put your solution in that hot water. The weaker the solution the better, because it has been proven very clearly that in all salt solutions there is an ionization going on all the time. The weaker the solution the more rapid the ionization. You can place your disseminating pad over the area of the spine which controls the activity of the parts which you are treating and the action electrode in the basin. That not only acts directly on the nerves we are treating, but also upon the nerves that control the blood vessels of those parts. You get a dilatation there, and if you are using the negative pole on those parts you get somewhat of a resolvent effect upon the parts also. I have never thought it anything unusual to relieve those cases in a few treatments. It is a thing that is so common that we do not look on it as anything special. I have relieved them many times without using anything but the hot water and salt to increase the conductivity of the current. You diminish resistance of the skin by the use of salt in the water, and that is doing a good deal. We ought to know all the methods, and not be confined to the high frequency or the static currents.

Dr. Frauenthal: I simply wish to say that I have used the plain electric method in the hospital to see if I got the same results without the medication. I had the house surgeon use it some ten times, without the same result.

I do not know what to say to a man who says that anything introduced locally is drawn out locally. The circulation goes on in about a minute. If you introduce anything on one side of the neck it will be on the other side of the neck in the arterial blood in less than a minute.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

Inoperable Primary Carcinoma. By George E. Pfahler, M.D.,
New York and Philadelphia *Med. Jour.*, April 26, 1913.

"In the treatment of inoperable primary carcinoma of the breast, the Roentgen rays do not enter into competition with any other method, since there is no other that has accomplished sufficiently good results on this class of patients to deserve comparison. Any cure, any increased comfort, or any improvement is just so much gain in a class of patients that is otherwise hopeless."

There are two different kinds of inoperable cases, one due to the extent of the disease and metastasis and the other, cases in which it is complicated with other serious organic lesions, themselves a bar to operative procedures. In this class of cases we can still hold out considerable hope, how much will depend upon the extent of disease, rate of growth, and condition of the patient, also much on the skill of the operator.

This report includes twelve cases that cover the cases which the author has treated in the last twelve years. He has also treated hundreds of cases of recurrences after operation, which will be reported later.

Case 1.—Mrs. B., aged 73, November 8th, 1902. She had injured her left breast three years previously, and noticed the tumor 18 months before coming for treatment, at which time it was four inches in diameter, had bled frequently and profusely. The discharge was offensive, but no perceptible glandular enlargement. Inoperable on account of cardiac disease and age. The bleeding, discharge and tumor decreased progressively. Treatment was irregular on account of frequent attacks of broncho-pneumonia and rheumatism. In 1906 Dr. Robinson informed me that Mrs. B. died four years after beginning treatment. The tumor mass had entirely disappeared, which you remember was about the size of a half cantaloupe. In place of it there was a small ulcer, with retracted tissue about it and considerable induration of tissue around it. There was never any symptoms of metastasis. Pain was never present, even after she was confined to her room. She died from exhaustion, age 77 years.

Case 2.—Mrs. E., aged 83, in 1903. The tumor had been noticed about one year previously, and was about the size of your half fist. No enlarged glands. Inoperable on account of feeble condition from arteriosclerosis and cardiac disease. She was seldom able to leave her room and was treated there.

The tumor gradually became smaller, more movable, and softer until at the end of six months there appeared to be nothing but shrunken scar tissue. She has had sixty-four x-ray treatments, after which it remained stationary without further treatment. The family moved away, and I learned that two years after she developed a carcinoma of the cervix, from which she died one year later. There was no recurrence in the breast after four years.

Case 3.—Mrs. B., aged 70, began treatment in 1904. The tumor was of two years standing, being three inches in diameter with retraction of the nipple. This was typically a scirrhus carcinoma. The patient absolutely refused operation, on account of the atheromatous condition of her arteries and her age. The tumor was reduced by the x-ray in six months to a small fibrous mass one inch in diameter and one-half inch thick and freely movable, leaving a puckered appearance, without pain, giving no annoyance during eight years she was watched by the author. She died of senile changes in 1912.

Case 4.—Mrs. —, age 49, was operated on five years before she came under observation for carcinoma of the left breast. Recurrence occurred in two years, when she came to author. The tumor then involved the entire mammary region with axillar and supra-clavicular involvement. It was a hard, painful and adherent nodular mass, ulcerated in several places. He feared nothing could be done, but treated her as requested with the x-ray. In one month the mass was reduced to one-third in size and the ulcers were all healed, and in three months no tumor could be palpated. This case has been kept comfortable through operations and the x-ray for four and one-half years, and still living.

Case 5.—Mrs. T., age 38. Tumors had been noticed in the breast eight years previously. They gradually increased in size and secondary nodules appeared under the anterior axillary folds. At the beginning of treatment there was a mass one and one half inches in diameter in the upper and outer quadrant of the left breast, with small nodules under the fold of the left axilla. Both were hard, nodular and adherent. There was a similar tumor in the right breast in the lower and inner quadrant. She was considered inoperable on account of the extent of the disease. She was treated three times weekly at first. During the last three years she has been seen once or twice per month for treatment or observation. In all she has been treated 114 times. The tumors are reduced to a fibrous mass about one-half inch in diameter, and is freely movable and not tender. Her general health has at no time been interfered with. In appearance she looks perfectly well. This patient is living after four years, having suffered no inconvenience except some telangiectasis.

Case 6.—Mrs. H., age 60. A tumor had been developing for one and one-half years, and when first seen it involved the whole breast with hard nodules in the axilla, and in addition she had an aneurysm of the arch of the aorta and an irregular heart action, thus making the case inoperable. Under treatment the disease apparently disappeared and the whole mammary area became soft and movable in about nine months from about 54 applications. She then developed a cardiac failure and was laid up in bed for two months. After a year or more of arrest she developed a metastasis elsewhere, which ceased on treatment.

Case 7.—Mrs. G. Carcinoma of the breast of three years' standing. Ten months later she came under observation with an ulcerating mass four inches in diameter, which was adherent to the skin and ribs with metastatic nodules about the tumor. There were enlarged glands in the axillary and supraclavicular regions. Under treatment the ulcer gradually healed, the tumor disappeared, and the scar tissue became movable upon the chest wall. About one year later she developed another tumor in the right breast, upon which the x-ray was used with like effect. The good effects of x-ray were shown even in this patient with a pronounced constitutional tendency.

Case 8.—Miss H., aged 45, had noticed a tumor in the right breast for months and thought it due to a bruise. Her sister had died of carcinoma of the uterus about one year previously. The tumor in the right breast was the size of a hen's egg, and there was a small palpable gland in the axilla. In the upper and outer quadrant of the left breast was a tumor about the size of a pigeon's egg which was palpable. She had signs of an osteo-arthritis in the cervical and dorsal regions, and also a polypus in the cervix uteri. There being some doubt, Dr. Wamouth amputated the right breast and cleared out the axilla. Microscopic examination by Dr. Wieder showed distinctly that it was a scirrhus carcinoma. Within two weeks she had the sharp pains of carcinoma, and in one the entire operative field was indurated. Very active daily treatment was given to the recurrence on the right side until a slight dermatitis occurred; then treatment was given to the left breast, which was clearly inoperable; then each side was treated alternately until all evidence of recurrence had disappeared from the right side, and in the left inoperable breast had become soft and all parts freely movable. In all she had had 186 treatments of the ray. At the end of nine months no evidence of the disease could be recognized. Some two years later she bruised the left breast. The skin which had been damaged by the ray became eroded and painful. Dr. Wamouth was then requested to excise the left breast, and Drs. Case and McFarland after careful study declare

there was no sign of malignancy anywhere. Certainly this was a striking and unusual result.

Three other cases were reported, all inoperable, which were brought to a successful and happy termination by the same technique and patience as that followed in the first nine cases reported.

The details of technique—dose—each application in the early cases corresponds to about 4/10 of an erythema dose. This dose should be accurately measured, either by the Kienbeck quantimeter, the Holzknecht radiometer, or the Sabouraud or Noir disks. The tube should produce penetrating rays corresponding to six or seven Benoist and should be kept uniform. If tubes are allowed to get soft the skin will absorb nearly all of the rays and a burn will result. Large machines will enable the operator to cut down the time of exposure, but are more dangerous to the tube. The time of exposure will depend on the kind and power of the machine, and will vary from 5 to 25 minutes, but must never exceed the erythema dose. Ordinarily the quicker all parts get a full dose the better, but this has to be varied. He commonly begins with full treatments to get every part under control as quickly as possible. When all parts of the skin have received the full dose, the treatment should be interrupted for two or three weeks. The distance of the anode from the skin is about twelve inches.

Protection of the skin is very important; a dermatitis should be avoided as far as possible. The parts of the body free from the disease should be protected by lead, especially about the head and face. A sole leather filter is of use, and also one mm. of aluminum if needed. The disease should be attacked in as many directions as possible. Care should be taken also to ray the mediastinum. Treatment will usually last for months. This treatment requires trouble and expense, but when we realize what we are treating it justifies the effort. Dr. Pfahler does not claim that these cases are cured. In fact, no one knows when a case of carcinoma is cured whatever the method of treatment.

Conclusions: 1. In inoperable cases of cancer of the breast, the x-ray treatment offers a reasonable hope of relieving the patient of the symptoms of the disease, prolonging life, and probably causing a complete disappearance of the disease.

2. Patients have been relieved of the symptoms of the disease from one to eight years.

3. No other agent has ever accomplished so much in this class of patients.

4. A careful mastery of technique is essential to success.

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

Seborrheic Keratosis Following Unusual Exposure to Light.
A. M. A. Journal.

Dr. Douglas W. Montgomery affirms that the actinic effects of strong sun or arc light is the etiological factor in the cause of seborrheic keratosis. (1) Patches of the above trouble begin to appear as small pigmented spots, and the formation of pigment is a well-known effect of light. (2) These spots are met with most frequently and profusely in persons who are exposed to light. (3) They appear almost exclusively on exposed parts of the body and the lesions are, on the whole, analogous to those of xeroderma pigmentosum, a disease in which light is known to be the exciting cause. (4) Chronic dermatitis from prolonged exposure to x-rays which are powerfully actinic presents the same set of symptoms as xeroderma and seborrheic keratosis, and may result as they do in epithelioma.

The statistics of Dubreuilh, of Bordeaux, are quoted to the effect that of 162 patients with seborrheic keratosis, 101 had outdoor occupations. Dr. Montgomery describes the case of an officer in the U. S. Navy, who was severely affected with this form of degeneration of the skin, and whose trouble dated from the time he was engaged in a coast survey. He was in a small boat for many hours a day, plotting figures on a sheet of white paper stretched on a board. The reflection of the sun's rays from sun-burn and from irritation of the skin of the face. The protective value of red as a screen for the sun's rays is dwelt upon, and the case of fine golden red color of the skin of the Apache is mentioned as an instance of natural endowment protection against the strong glare of the highlands of Arizona. The patient referred to would probably have escaped injury if he had had a red or yellow handkerchief tied down over his ears and beneath his chin, while a yellow veil and spectacles would have protected his whole face.

Eczematoid Ringworm. From the Urologic and Cutaneous Review

The occurrence of a fungous affection of the skin in the groins has long been known to dermatologists under the name of "Eczema Marginatum," which is an unfortunate one, since it gives no suspicion of the true nature of the disease, and many cases are still wrongly diagnosed as ordinary eczema and treated with the usual remedies with little or no benefit. This particular variety mainly affects the extremities and is divided into three principal groups. (1) A thick, scaly der-

matitis upon the soles of the feet, in which the horny layer is raised in patches. (2) An acute, vesiculous type, resembling clefts of the hands or feet and spreading from these towards the dorsum of the hand or foot in erythematous patches. (3) A chronic variety, which may succeed the acute type, consisting of scaly patches, the scales of which tend to loosen at the margin and to fall off, leaving a raw, glazed surface. Irritation or itching may be a marked feature of all types, and secondary impetiginous infection is, therefore, not uncommon.

In the case of the groin, the diagnosis is gretty generally straightforward, since the lesions have a sharply defined border and eczematous characteristics are here not so often seen. It is upon the extremities that difficulties are most likely to arise, but a microscopical examination of the scales in a drop of liquor potassa will generally give evidence of the presence of mycetium or of spores, if it be a case of eczematoid ringworm. The most common fungus attacking the groin, and which may also be found on the extremities, is the *epidermophyton inguinale* of Sabouraud, which does not attack the hairs, but flourishes entirely upon the epidermis. The diagnosis once made gives the key to successful treatment, for these troublesome lesions should disappear after the exhibition of nascent sulphur or, in more severe cases, of chrysarobin. In the more obstinate forms of the disease the static brush discharge and x-ray treatment from a low vacuum tube is the ideal method. (H. F. P.)

RADIOGRAPHY.

EDITED BY FREDERICK M. LAW, M.D.

Notes from the X-Ray Department of St. Bartholomew's Hospital. Metallic Intensifying Screens. By W. Steuart, M.R.C.S., M.I.E.E., Chief Assistant X-Ray Department St. Bartholomew's Hospital; Medical Officer in Charge of the Electrical Department, Seamen's Hospital. *Archives of the Roentgen Ray*, April, 1913.

In this article Dr. Steuart describes the use of a silver plate as an intensifying screen. He uses a copper plate silver plated on one side. Silver apparently giving the best results.

"The photographic plate is placed with the film away from the patient and in contact with the metallic plate. The x-rays, after passing through the glass and the emulsion, impinge on the metal, where they set up secondary rays, which intensify the primary rays." The intensifying effect is due to the x-rays and not to the fluorescent light, consequently dust and dirt do not interfere and spot the plate, as is the case with the ordinary intensifying screen.

Intensifying with a metal screen cuts down the exposure to a third or a quarter of the time and gives a wonderful improvement in detail. "The secondary rays given off by the silver plate are comparatively soft and have a much greater chemical action than the harder primary rays.

"The necessary number of milliamperere seconds of exposure should be given as quickly as possible."

Dr. Steuart also speaks of the fluorescence of glass plates. He says: "If an x-ray plate be taken from its envelope and exposed to a focus-tube in a dark room, it will be found that the plate fluoresces distinctly.

"As the effect of light on the silver emulsion is enormously greater than x-rays, it follows that a considerable part of the reaction on the emulsion is due to its fluorescence, and consequently the negative will be rendered more or less blurred.

"The x-rays passing through the emulsion impinges on the glass setting up fluorescence, which is reflected backwards and tends to blur the image on the emulsion.

"To remedy this it would be necessary either to stop the x-rays passing through the glass or stop the light rays coming back. The latter process could only be done by coloring the glass red, which would destroy the value of the skiagram, or make the plates of lead glass or a glass that would not fluoresce."

Acromegalia, Acromegalic Gigantism and Its Irregular Forms, Importance of the Data Furnished by Radiography. By H. Marques and A. Peyron. *Archives d'Electricité Médicale*, Jan. 10, 1913.

The subject is discussed from three points of view:

1. Etiological. There are two theories regarding the relationship between acromegalia and gigantism. (a) Acromegalia and gigantism have no relationship. (b) Gigantism should be acromegalia of adolescence.

2. Anatomic-pathological. The question here being yet undecided whether the hypophyseal lesion was the cause of acromegalia or whether acromegalia was a syndrome of "hyperhypophysisme."

3. Clinical. Clinically all types, including the mixed types, must be studied.

In order to facilitate this study, the authors call attention to the importance of radiography in showing the dilatation of the frontal sinuses, the thickness of the cranial walls and the dilatation of the sella turcica. These are of importance for diagnosis and prognosis when taken in conjunction with family history and clinical symptoms.

FRENCH ABSTRACTS.

EDITED BY EDEN V. DELPHEY, M.D.

Medical Applications of Diathermia. Thermic Action of High-Frequency Currents. Applications and Clinical Results. By Dr. J. Bergonié, Bordeaux. *Archives d'Electricité Médicale*, April 10, 1913.

Electrodes for diathermias. The first thing is to determine the best method of administering the current. This is best accomplished by the employment of bare metallic electrodes regulating the sizes to effects sought. The surface of a destructive electrode may be several millimeters square, but the neutral may be a meter square or more. It is also possible to apply heat with the condenser-bed or couch by auto-conduction. These means are, however, but little used for that purpose.

Innocuity of diathermia. May not the application of thermal penetration lead to disaster? It has been proved by a long and varied practice that the applications of thermal penetration, medical and not surgical, have not caused any immediate or ultimate lesion. Destruction is only caused when it is desired. Every involuntary accident has been caused by a faulty technique.

Surgical diathermia, also called *Electro-coagulation*, is applied to both *small tumors* and *enormous neoplasms* (Doyen). The technique is very simple: a very large neutral electrode (140 centimeters by 50 centimeters), upon which the patient lies with his surface in close and intimate contact with the electrode; and an active electrode of small surface, and therefore destructive, is applied to the tumor. A current of one to four amperes, according to the size of the destructive electrode, is applied for from ten seconds to several minutes. The destruction is proportionate to the intensity and time of application. This method has already given beautiful results. It sterilizes while destroying, opens no vessels, and causes no proximate or distant metastases. We should extend this method farther and induce a more close collaboration between the medical men and the surgeons.

Medical application of diathermia or thermal penetration. The tissues are heated in direct proportion to the volume of the current which traverses them. But experimentally as well as physiologically, it is found that the tissues are cooled in direct proportion also as the circulation is more active. If this circulation is suppressed with a Riva-Rocci armlet, the heat becomes insupportable. The heating of the adipose tissue causes acetone to appear in the urine. Moreover, the central temperature is raised when the applications of general diathermia are employed. It has also been determined by measuring the expiratory exchanges that during the applications

of thermal penetration there is a lessening of oxygen absorption.

The indications for medical diathermia are both local and general. All local affections in which active hyperaemia is indicated will be benefited by diathermia. I will not name them all—they are too many. As an example; in infections by virulent microbes, the virus or the germs are attenuated by diathermia. The reason is because they have a sensitiveness to heat which is greater than the healthy neighboring cells. The indications for general diathermia are also very numerous. Hypo-thermia from whatever cause is the principal (physiological misery, athrepsia, marasmus, anaemia, alidity of those suffering from toxic conditions, or of convalescents, or of the aged). We must also think of reactional hyperthermia which we can produce and which costs the organism nothing. Moreover, since the organism heated by diathermia diminishes its metabolic exchanges, it supplies it with a supplementary amount of energy which otherwise need to be drawn from food. This is what I have called "Diathermia as an excess ration" and which should not be confounded, as has been done, with the entire nutrition and as rendering all alimentation unnecessary. Thanks to the added energy introduced by diathermia, to this transfusion of the heat of nature, the sickly, poor, weakened, hypothermic organisms are relieved of their physiological misery and have again become normal individuals. *Conclusion.* There is for electrothermal treatment, medical as well as surgical, a therapeutic future which even the most optimistic can neither foresee nor limit.

The Scientific Basis of Thermo-Penetration or Diathermia. By Dr. Von Zeynik, of Prague. *Archives d'Electricité Médicale*, April 10, 1913.

The author reviews the history of high-frequency currents, and follows this in detail with the technique and the various forms of electrodes employed. He recommends a preliminary careful cleansing of the skin upon which the electrodes are to be employed, and for the latter he uses a spongy tissue impregnated with a chloride of soda solution, to which is added carbonate of soda. He questions whether the effect produced is that of the high-frequency current alone, and suggests that there are other effects which are as yet entirely unknown. Experience may teach us later what these effects may be. The applications of high-frequency currents may result in local heating, electro-coagulation, etc., or in a general heating of the entire body; the former method is most employed. In order to appreciate the method of this action, we must consider the conductivity of the successive layers which the current traverses. The layers having the greatest resistance absorb the

most energy and consequently are heated most. The heating will depend also upon the specific heat of the tissues. When several layers of unequal conductivity are placed parallel in the direction of the current, the current and consequently the heat will follow the layers of the better conductivity. The author refers to the statement that thermo-penetration influences the nutritive exchanges of the organism. Certain authors found that it produced an augmentation of the pulse, abundant perspiration, congestion of the vessels of the kidney, and an augmentation of the urinary secretion. Bergonié and Rechou have shown, in their experiments, a very sensible diminution in the respiratory exchanges. I have experimented upon rabbits, and I have obtained the same results, viz., I have also found a diminution in the amount of carbonic acid gas exhaled by these animals. The author questions as to whether the high-frequency currents do not have an effect upon the chemical action of nutrition. Nevertheless, he refers to the experiments upon albumin, haemoglobin, haematin, which produced only negative results. It is the same with the experiments upon bacteria when the intense thermic action had been excluded. But Laqueur has proved that certain microbes, the gonococci, even in living organisms, may be destroyed not by chemical but by the thermic action, and yet notwithstanding this action upon the microbes, there was no destruction of the normal tissue. Analgesia caused by thermo-penetration is a fact which the author confirmed by personal experience. As to the other actions of electro-thermal penetration, they should not be considered too lightly, and if, by the marvelous discovery of d'Arsonval, who has given us the high-frequency currents applicable to medicine, energy can be infused into the living organism, it is only under the form of a reduced energy.

The Zinc Ion in the Therapeutics of Localized Infections.

Considerations Upon Its Mode of Action. By H. Marques, Chef de Laboratoire; J. Madon, Préparateur. L. Pech, Aide-préparateur. A la Faculté de Montpellier. *Archives d'Electricité Médicale*, Jan. 25, 1913.

The authors have treated cases of staphylococcus aureus infection, such as furuncles, acne, and one case of lymphangitis of the forearm. The lymphangitis was caused by the pricking of the skin at the wrist, resulting in swelling, redness, tenderness and much heat. The forearm was completely covered with cotton saturated with a two per cent. solution of chloride of zinc, and upon this was placed a large zinc electrode and connected with the positive pole. The negative pole, saturated with salt solution, placed on the posterior surface of the thorax. A current of forty ma. was then passed for thirty minutes. This was followed by a wet dressing, renewed twice

daily. On the second, third and fourth days these seances were repeated when normal conditions were restored.

This work was then verified by animal experimentation. The treatment was given just before inoculation by the staphylococcus and in other cases only after the inoculation, continuing the seances two, three, or four times on successive days, resulting in a cure in every case.

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERICK DE KRAFT, M.D., NEW YORK.

Operations in the Bladder with the Aid of High Frequency Currents. By Dr. G. Burley and Dr. Ernest W. Frank, of Berlin. *Muenchner Medical Wochenschrift*, Feb. 18, 1913.

With the aid of high frequency currents (fulguration, thermopenetration, etc.) it is possible to operate without loss of blood and without incurring any danger of infection.

The high frequency current is far superior to the Paquelin cautery, because it is possible to avoid undesirable side effects much better than by that method. The heat effect can be carried further and the localization of the action is much simplified. The principal advantage of the new method is the wonderful regulation of the heat-effect.

High frequency currents are alternating currents of enormously high oscillations. These run up into several millions per second. High frequency currents are converted into heat in direct proportion to the ohmic resistance they have to overcome. The human body offers a high resistance to electric currents, hence a large part of the electricity flowing through the body is converted into heat.

As a result of the enormously high rate of alternation of high frequency currents no chemical, nerve, or muscle effects are possible. A certain definite time is necessary to produce a reaction. Before this can happen, the current changes its direction and reverses the action. Such a current can make no other impression in the body than that of heat. It is for this reason that we are enabled to employ high frequency currents up to two and three amperes.

According to Joule's law, the quantity of heat evolved in a unit of time is directly proportional to the resistance and the square of the current strength. Hence if we double the current strength we quadruple the amount of heat produced. It is possible to produce high frequency currents of varying tension. The higher the tension the greater the ease with which resistance is overcome. Hence a smaller quantity of current will be converted into heat if the resistance be the same and

the tension of the passing current be high. The higher the voltage the more side effects and spark production are favored if the electrodes are not in good contact. A high voltage also militates against certainty of localization of the action. Hence it is advisable to use a high frequency current of low voltage. The resistance is directly proportional to the length and inversely proportional to the diameter (cross-section) of the conductor. Therefore, the heat production must be highest where the cross-section of the conductor is smallest. It is for this reason that we feel the heat first at the wrist when we pass the current from one hand through the body of the patient to the other hand. The heat accumulates also more quickly at these places.

The heat effect will vary with the size of the chosen electrodes and the cross-section of the part. If we apply two electrodes of equal size to a body whose cross-section remains equal throughout its length then the current runs in parallel lines and the heating is equal throughout. If, however, the body should be thinner at its middle than at the ends, then the lines of current flow will be densest at the thinnest part and the warming effect will be greater at this point, if the electrodes are of equal size and larger than the thinnest part. If the electrodes be *smaller* then the lines of force will diverge and the greatest heat effect will be at the point of contact of the electrodes. If one electrode be very much larger than the other then the lines of force will be densest at the point of contact of the smaller electrode. The highest degree of warmth is obtained at the point of contact of a sharply pointed electrode, and practically none at the part where a large indifferent electrode is applied.

Such an enormous condensation of the current at the very small point results in such rapid accumulation of heat that burning of the tissue at this part results instantly. We can, however, vary the heat effect by a judicious selection of the size of the electrodes to such an extent as to obtain any degree of action, from a slight hyperæmia to a coagulation of the albumen, and even to the point of burning. We can also vary the heat evolved by varying the strength of the current.

To apply this method in practice we place a large electrode (about 200 sq. cm.) on any part of the body, and connect this to one side of the apparatus. To the other side of the apparatus we connect a small electrode in bougie form, which is introduced into the operating cystoscope. The bladder is first distended with salt solution; and then under the guidance of the eye we bring the small electrode in firm contact with that part of the bladder wall in which we wish to operate. A small amount of current is turned on and gradually increased. A white discoloration around the electrode shows the coagulation of the surrounding tissues. Should we increase the

current further we will heat the water which touches the white spots to the boiling point, because the heat reaches 100° C. Blisters thus produced are not due to any electrolytic action, but are solely the result of the boiling of the water. As soon as the heat reaches a point where the tissues in contact with the electrode are burned, this burn increases the resistance to the current greatly. The current being interrupted, a spark becomes visible and electrolytic effects are produced.

Only in case of burn does the electrode become adherent, and will never stick to the tissues in simple coagulation. We can regulate the superficial as well as the deep action by a judicious selection of electrodes. The more pointed the electrode the more extensive the superficial action, the broader the electrode the greater the depth of the action.

If a pedunculated tumor is to be operated on we place the electrode on the broad end of the tumor. The greatest density of the current being at the pedicle, this is coagulated, the nutrition of the tumor cut off, and in a few days the tumor falls off. Many authors have employed the spark. Bucley reasons that only a superficial action is obtained in this way. The local heat effect brings the water to the boiling point. This causes a clouding of the water and of the operating field.

The employment of sparks causes unnecessary irritation of the patient and a faradic sensation. The electrode in contact and a low potential avoids this. The danger of producing rupture of the bladder or coagulation of the bladder wall is a small one, because we can proceed slowly and watch the action. Dr. Edwin Beer's report in the *Centralbl. f. Chir.*, 1910, No. 34, on the treatment of tumors of the bladder led Frank to try the method in a case of multiple papilloma of the bladder. Some of the papillomata were of the size of a walnut, and were so situated at the neck of the bladder that they extended into the prostate. One electrode was placed on the thigh of the patient and the other was introduced through a ureter cystoscope into the bladder and placed in contact with one of the papillomas. A current of 0.3 ampere was used.

This was Aug. 14, 1911. The procedure produced no pain and only slight hemorrhage. This procedure was repeated at intervals of 10 to 12 days until a pleurisy necessitated interruption. On Jan. 9th the treatment was resumed. A flat knife shaped electrode was employed in this manner. The flat surface was placed parallel to the wall of the bladder while the edge of the instrument was directed to the base of the tumor. In this way a much greater portion of the tumor could be coagulated at one sitting; the patient experiencing great relief during urination three days later. The residual urine, which had been between 100 to 200 c.c., was reduced to 25 c.c. Another papilloma was almost totally destroyed

six days later. Four more applications were made. A cystoscopic examination in September revealed the fact that all papillomata which had been treated had either disappeared or were markedly reduced in size.

A 24-year-old girl had a pedunculated polypus which was growing rapidly. This was coagulated Jan. 19 with a current of 0.3 ampere applied for 1½ minutes. A month later only a small scar was visible at the site of the former seat of the polypus.

A man aged 50 had noticed blood in the urine for six months. A cystoscopic examination revealed a papilloma of the size of a walnut seated near the mouth of the left ureter. On Sept. 25th a current of 0.3 ampere was applied by means of a flat electrode to the base and the surface of the tumor. An examination on Oct. 1st showed in place of the papilloma a completely coagulated round formation. On Oct. 22nd the papilloma had disappeared and all incidental symptoms as well. Ten days later only a slight scar was visible.

Treatment of Papillary Tumors of the Urinary Bladder with the High Frequency Current (Oudin). By Edwin Beer, *Jour. A. M. A.*, Nov. 16, 1912.

One hundred and eighty-three cases of intravesical papilloma have been treated so far by different surgeons. In addition twenty cases of urethral papilloma have been treated in the United States. The method is also now used in France, Germany and Austria. Beer considers the original copper wire electrode better than the present output. Experiment may demonstrate that other metal electrodes will be more effective than copper. Experiment may also evolve a better medium than distilled water. Beer doubts whether the d'Arsonval current will displace the Oudin to any degree, because the latter possesses more cauterizing and electrolytic (?) action. All cases where a microscopical examination shows malignancy should be excluded from this therapy.

BOOK REVIEWS.

THERAPEUSIS OF INTERNAL DISEASES. (A System of Four Volumes.) Edited by Frederick Forchheimer, M.D., Sc.D. (Harv.), Professor of Medicine, Medical Department, University of Cincinnati (Ohio-Miami Medical College). D. Appleton & Co., Publishers, New York and London. Price \$25.00.

Probably no more able and capable editor could have been chosen to prepare a work on internal medicine than Dr. Forchheimer, whose previous works have shown his fairness and

progressiveness, with an earnest effort to supplant empiricism with practical, rational medicine. The contributions are in full accord with the spirit of the editor. The first volume is devoted to general therapy, considering the Physiochemical principles in Therapy, Organotherapeutics, Vaccine and Serum Therapy, the Principles of Medical Climatology, Massage and Gymnastics, Mechano-therapy, Electro-Therapeutics, Radiant Light and Heat Therapy, Radium-Therapy, X-ray-Therapy, Psycho-Therapy, Nutrition and Dietetics and Toxicology. The subjects include the entire scope of therapy, treated as they have been treated in no other textbook to the present time. In the second volume the chapters are devoted to infectious diseases, giving all the modern methods of coping with this large class of conditions. Section II. is devoted to Intoxications, including all the various habits which cause them and other poisons which affect the organism. Section III. is devoted to the consideration of Constitutional Diseases, including a full consideration of the subjects of Gout, Arthritis Deformans, and Diabetis Mellitus, etc. The third volume treats of the Diseases of the Digestive System, the Respiratory Tract, Circulatory System, and Diseases of the Blood. Volume IV. treats of the Diseases of the Kidneys, Blood, Male Sexual Organs, Nervous Systems and Topical Diseases. No previous work has given so thorough and practical consideration of the many subjects treated by progressive authors than this system. It is a work not too voluminous, edited with great care, and published in exquisite style. It has a very full cross index in a desk volume, which adds very much to the value of the work as a reference book. The editor and publishers are to be congratulated upon the general character of the work.

THE NARCOTIC DRUG DISEASES AND ALLIED AILMENTS, PATHOLOGY, PATHO-GENESIS AND TREATMENT. By George E. Pettey, M.D., Memphis, Tennessee, Member Memphis and Shelby County Medical Society, Tennessee State Medical Association, American Medical Association, Tri-State Medical Association of Mississippi, Arkansas and Tennessee; also Mississippi Valley Medical Association, Southern Medical Association, and of the American Society for the Study of Alcohol and Narcotic Diseases. Illustrated. F. A. Davis Company, Publishers, Philadelphia. Price \$5.00 net.

In this work the author treats of the habitue as a neurotic and his condition largely as a disease. "The vital and essential principle of the treatment advocated is elimination. This method, with all its auxiliaries, is presented herein in detail, and furnishes a rational basis for the scientific medication and humane management of these cases." In the treatment of the habitue the writer relies upon drugs, diet and exercises and physical training. Like many writers, he has not discovered

the great value of physical agents in the promotion of elimination and restoration of the nervous mechanism. In his chapter on Symptomatology the writer calls attention to the symptoms which will indicate the presence of a habit and lead to a suspension of the respective failing, suggestions which are well treated and will be valuable to the diagnostician who must be alert to institute the correct management of a *symptoms complex*. He may thus discover habits underlying a general derangement. He covers the use of various tonics and the antispasmodics and eliminants of the pharmacopœia in a thoroughly rational manner. The moral management of the cases is also accorded an important place to assist in controlling and correcting the habits of the unfortunates.

The work on the whole, with the case reports, furnishes a very complete resumé of the subject. The book is published in the characteristic excellent style of the well-known publishers.

AN INTRODUCTION TO THE STUDY OF INFECTION AND IMMUNITY. INCLUDING SERUM THERAPY, VACCINE THERAPY, CHEMOTHERAPY AND SERUM DIAGNOSIS. By Charles E. Simon, M.D., Professor of Clinical Pathology and Experimental Medicine, College of Physicians and Surgeons, Baltimore. Octavo, 301 pages. Illustrated. Lea & Febiger, Publishers, Philadelphia and New York, 1912. Cloth, \$3.25 net.

The researches of the past decade have developed so much that is new and valuable on the subjects treated so clearly in this work that the critical reviewer and the student and general practitioner, who would keep pace with the progress of medical thought, is certain to be gratified. The author makes, in his first chapter, a strong appeal for the institution of rational treatment, to the exclusion of therapeutic empiricism, calling attention to the weakness of the attitude of medical science in the past. He pays tribute to surgery and serum therapy, but surprisingly overlooks the natural therapeutic agents which play such an important role in modern therapeutics. The work considers the subject, and the nature of causes and defences of infections of the organism. It considers the various bactericidal substances in the blood, antigens, and antibodies in the processes which make for immunity in a thoroughly practical and scientific manner. The writer has given a broad consideration of the different aspects of the subject, constituting a valuable resumé to this important field of research.

The work of 300 pages is illustrated, printed on firm paper, and published in the usual excellent style of the publishers, and is, on the whole, a valuable addition to medical literature.

ELECTRICITY IN DISEASES OF THE EYE, EAR, NOSE AND THROAT. With illustrations by W. Franklin Coleman, M.D., M.R.C.S., Eng. ex-President of and Professor of Ophthalmology in the Post-Graduate Medical School of Chicago, ex-President of the Ophthalmological Society of Chicago, Professor of Ophthalmology in the Illinois School of Electro-Therapeutics, Chicago, etc. Published by The Courier-Herald Press.

In this work the author has not confined himself entirely to the subjects under consideration, but has given considerable attention to the physics of the subjects, devoting an entire chapter to a subject which will be valuable to many physicians who are as a rule quite unfamiliar with electro-physics, which can, however, be obtained from other textbooks. The writer has furnished a set of original drawings which tend to make clear the physics. He also discusses in the same chapter the physics of light, heat and the x-ray. Chapter II. is devoted to the discussion of apparatus, showing the apparatus of various manufacturers. Another chapter is devoted to a consideration of the author's own equipment, which is valuable as denoting the facilities which he has for the work treated. In the second section he discusses various electrical currents and their actions or effects upon the organism. In this he shows a greater familiarity with uses and indications for the constant and sinusoidal currents than for the static and high frequency currents. These, however, have less importance from his point of view for the diseases under consideration. The writer has treated the subject of therapeutics and physiological actions of the x-ray, light and electricity from the point of view of a large number of authors, and with a fairness that indicates a wide study and consideration of the subject. In treating the separate subjects under consideration he has brought into use all of the physical agents as indicated, and from the published results indicates a large experience which make the work valuable from a clinical point of view. No subject seems to have been neglected in the author's effort to place the work on a scientific basis. It will be read with a great deal of interest by the students of electro-therapeutics and the specialists in the subjects treated. It is a valuable work, comprising a treatise of 600 pages, is well bound and printed on good paper.

The Journal of Advanced Therapeutics

VOL. XXXI.

JULY, 1913.

No. 7

Edited by DR. WILLIAM BENHAM SNOW

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SCIATICA AND ITS TREATMENT.

In a recent number of the *Medical Record* appears a leading article by an Instructor in Nervous Diseases in one of the leading medical colleges, on "Sciatica and Its Treatment." The author has treated well the pathology and etiology; but treatment, as given by him, offers very little for encouragement for relief, and no assurance of a cure of the condition.

Of the use of electricity he says: "Electricity is recommended by many. It is given in two forms, the galvanic or high frequency. Either of these, in my opinion, is of doubtful value. The high frequency current can have but little effect, save from a psychic point of view. The galvanic current (3-5 milliamperes should be given) may serve, but to no great extent. It has always seemed to me that in the treatment of sciatica electricity occupies but a small and insignificant position."

The methods advocated by the writer are: rest in bed; counter-irritation, including the use of the Pacquelin's cautery, applied the whole length of the nerve; applications of heat, baths, internal medication; and finally, "injections into the nerve of about 100 c.c. of normal saline solution at the body temperature, under considerable pressure."

The prognosis which this writer gives would be very unsatisfactory to the patient if he were to state to him what he has declared in the paper. It is very unfortunate that at this time when there are ways of treating sciatica successfully, with relief of most early cases in a few days, that the

teaching body of the medical profession are not conversant with effectual methods.

The writer of the paper refers only to the constant and high frequency currents as available for treating sciatica—the two currents which are the least effective in these cases, omitting all reference to the current which is most effective for the relief of neuritis. *The static modalities* are uniformly successful in these cases, except in cases complicated by necroses, exostosis, or malignant processes.

When the lesion is at or below the sacro-sciatic notch the exact site is readily diagnosed with the static wave current. An electrode when applied directly over a lesion will produce marked pain with a short spark gap; whereas, under ordinary conditions, the same current applied over the same site would cause no pain. The pain occurring under these conditions, when only a short spark gap is employed (one of one-half to one inch) demonstrates the presence of the lesion exactly at the site of the pain.

In fully 10 per cent. of cases in males and a larger number in females the pain is due to pressure of an enlarged prostate or subinvoluted, congested or fibroid uterus. The relief of these cases depends upon the removal of pressure by the treatment with reduction of the enlarged viscus. This is readily accomplished by the x-ray applied above the pubis in uterine fibroma, or by application of the static wave current applied in the rectum for treatment of a subinvoluted or congested uterus or an enlarged prostate.

Sciatica arising from sacro-iliac luxations, the so-called Goldthwaite's disease, are only amenable to relief by treatment of that condition, for which the same measures—the static modalities—are employed.

It is an established fact by those familiar with the method, that neuritis is promptly cured in all early uncomplicated cases in a few days, and in chronic cases in a time relative to the degree of exudations or adhesions that have formed about the lesion. It is presumed that these facts will soon become known and recognized by all progressive members of the medical profession. For humanity's sake, it is deplorable when there is a successful method of curing this distressing condition that it cannot be generally known.

Members of the medical profession who are not conversant

with the use of electricity and know nothing of methods and effects of the static current, as have been known and taught for the past twenty years, should investigate it. It is a source of regret that there is no disposition at the present time on the part of many gentlemen in similar positions to that of the writer of the paper under consideration to investigate or recognize the later developments in the use of this current. When a professor will tell his class that these cases (sciatica) will be profitable, because they will keep coming to see the physician, but will not be cured, it is the duty of those who understand the successful methods to do all in their power to extend the knowledge to those who teach as well as to the student.

THE TWENTY-THIRD ANNUAL MEETING OF THE AMERICAN ELECTRO-THER- APEUTIC ASSOCIATION.

The twenty-third annual meeting of the American Electro-Therapeutic Association, for which the secretary has already sent out the request for members to send in the titles of their papers, will be held at the Engineers' Societies Building, 29 West 39th Street, on September 2d, 3d and 4th. It is customary for the JOURNAL to publish these papers in the order in which the titles are received. It is therefore to the interest of all members to send in their titles as promptly as possible. In the next issue of the JOURNAL the preliminary program will be published.

The prospect of a goodly attendance of foreign members and other electro-therapeutists is encouraging. The indications are that the next meeting will be the most interesting and instructive in the history of the Association.

The exhibits will be a valuable feature of the meeting. A large room has been set aside for the purpose, and the Committee on Arrangements are actively soliciting applications from various manufacturers, and are expecting a large exhibit. The exhibitors will find this meeting of sufficient value and interest to them that they should avail themselves of the opportunity of making a large exhibit.

HYDROTHERAPY: THE GENERAL EFFECTS AND BENEFITS OF HYDROTHERAPY.*

BY DR. J. C. WALTON, RICHMOND, VA.

Hydrotherapy includes the application of water in any form, from the solid and fluid to vapor, from ice to steam, internally and externally. Water is not only the most abundant and indispensable of all the elements, but it is also the most flexible of all remedial agents.

It can be administered at temperatures ranging from 40° to 120° F. When we realize that a change of five degrees in temperature causes a marked difference in its effect you can readily appreciate what an enormous latitude is offered for grading its effect on the human organism.

The external effects of water are due chiefly to its thermic and mechanical action, and to its irritating effects on the neuro-vascular and cutaneous systems.

The cardinal principles to be observed in the external application of water are the temperature, the pressure and the duration of the application. Temperature and duration are of vital importance. To test dip your hand into water at a temperature of 40° F. for one minute; remove and dry it, the skin becomes warm, red and feels pleasant. Dip the other hand into the same water for three minutes; remove the hand and dry it, the skin is cyanotic, the hand is painful, and some time elapses before warmth and comfort are restored.

Pressure is also very important, for when water is applied at a pressure of from ten to forty pounds its effects are very much enhanced and the reaction is also much more prompt and decided.

In administering water the changes from hot to cold should be made very gradually, never abruptly, as your object is to avoid too great shock. The attendants should always be careful and see that the patients respond promptly as evidenced by a prompt reaction.

In administering water the organism should be gradually trained to produce its own reaction. One of the prime objects to be derived from taking a bath is to increase oxidation. It is therefore of vital importance that the bath rooms should be well ventilated and never allowed to become warm and

*Read at the Twenty-second Annual Meeting of the American Electro-Therapeutic Association, at Richmond, Va., Sept. 5, 1912.

stuffy; the attendants should be well impressed with the fact that heat is enervating and depressing, and that cold is tonic and stimulating.

The recognition of the above principles by modern hydrotherapists has largely been instrumental in replacing that relic of barbarism, the Turkish and Russian bath, by the modern cabinet and electric light bath. In institutional work a modern hydrotherapeutic outfit so constructed as to give the operator perfect control of the temperature and pressure is a *sine qua non* in the successful treatment of chronic diseases. In hydrotherapy probably more so than other remedial agents the element of precision and the careful attention to minutia and detail is absolutely necessary to obtain successful and satisfactory results. In private practice much has been accomplished, and when we consider that it can be administered at any bedside, the only essentials required being a basin of water, a towel with a modicum of gray matter, its manifold advantages must be obvious even to the most callous.

Hydrotherapy has scored a most brilliant success in the treatment of typhoid fever, notwithstanding the fact that the majority of practitioners in the beginning had false conceptions regarding the indications for hydrotherapy in this disease, *i.e.*, they fought the temperature instead of toxemia.

Baruch long since demonstrated that hydrotherapy was valuable in typhoid fever by its tonic and stimulating influence upon the vital centers, and by its power to arouse the dormant nerve centers in order that they might properly respond to external stimuli and thereby throw off the toxemias that were destroying the patient.

Baruch also taught us the great value of the cold bath in making the differential diagnosis between typhoid fever and pneumonia, showing that while the cold bath had only a slight effect on the temperature of typhoid fever, that its effect on the pneumonic temperature was very prompt and decided, not infrequently amounting to several degrees.

In stomach and bowel disease, washing out the former and irrigating the latter is the quickest and most effective way of obtaining true disinfection of these important avenues from which we get the majority of our infections.

As a local application in the early stages of congestion cold compresses are indicated so long as the circulation is active

and the color good. When, however, the parts assume a cyanotic hue and leucocytosis has taken place, then change to warm compresses to hasten suppuration which is unavoidable.

Cold applications diminish congestion, retards leucocytosis and emigration of the white cells, while warm compresses have just the opposite effect. As cold applications have the tendency to raise, and warm applications to lower the blood pressure, it is very important when giving the light to reduce tension, to follow the bath with warm douches at the body temperature.

One of the most remarkable therapeutic advances of recent years is in the treatment of insanities, maniacal excitements, etc., by the prolonged hot bath. The patient is placed in a cradle or frame and is lowered into a tub of hot water, and left there sometimes not only for hours but frequently days and weeks.

The above treatment is very soothing and restful, and has been known to quiet and put to sleep the most violent insane patients. So satisfactory has this treatment become that it has gradually replaced other methods of treatment for various forms of insanities. This is now the standard treatment in the Manhattan State Hospital on Ward's Island. Insanity is now regarded by many as a symptom of physical illness, and the patient on entering the hospital is treated accordingly. So instead of the padded cell, the bath tub; instead of the straight jacket, the scotch douche.

In serious lacerated injuries of the extremities, and in conditions of poor local circulation, prolonged immersion of the parts in hot water frequently saves the limb by giving nature and the vital forces time to react and to recuperate.

THE USES OF WATER INTERNALLY.

The use of water internally is more important and necessary than it is externally.

Owing to the great natural difficulties in obtaining a sufficient supply of pure drinking water this problem is rapidly becoming a very serious one with municipalities, and like Europe this country will soon become dependent upon bottled waters for this purpose.

No form of life can exist without water, and as water is the universal solvent as well as the natural eliminator of our bodies, ordinarily it should be drunk freely, using from two to three quarts daily.

"The solvent action of water upon toxins in the blood and viscera cannot be too strongly emphasized.

"Catabolic waste material is diluted and more readily eliminated and autointoxication and stasis relieved or obviated."

The drinking of cold water before meals stimulates gastric secretion. "Hot water drinking diminishes gastric secretion; therefore, for hyperchlorhydria order hot drinks and for hypochlorhydria cold drinks. Carbonated waters stimulate peristalsis and also increase the secretion of the healthy gastric mucous membrane. (These waters cause diuresis by increasing blood pressure.)"—Dieffenbach.

"According to Huggard, water taken into the stomach does not remain there long; its absorption takes place to only a small amount in that organ, most of it passing through the pylorus. In a man water appeared at a fistulous opening in the duodenum half a minute after being drunk. In a horse it appeared in the cæcum six minutes after being swallowed."

Both hot and cold water in moderate quantity appears to excite the peristaltic action of the stomach; but hot water passes on more quickly. Cold water in large quantities arrests the movements of the stomach. Both cold and hot water excite the secretion of gastric juice, but cold is more active in this effect.

Peristalsis of the bowels is also promoted especially by cold water. In large quantities and for therapeutic objects hot water is better borne than cold unless fever is present, and then cold water or ice sucked is more agreeable to the patient and at the same time tends to lower temperature.—Huggard.

RADIO ACTIVE WATERS.

One of the most important recent discoveries, as well as one of the most practical and far-reaching in its results, is the scientific fact that the curative effects of certain noted mineral waters are due to their being radio-active.

This largely explains why these waters have more effect when drunk at the springs. From time immemorial the pro-

fession have been at a loss to account for the beneficial effects derived from drinking certain popular mineral waters, as their analyses contained nothing which could possibly justify the claims of their most enthusiastic advocates. While the term "lithia water" was advertised and exploited, we all knew that none of these waters contained more than an infinitesimal amount of lithia, and we furthermore know that the lithia salts possess no special virtue, as uric acid or other solvents.

As tending to clarify this subject, I quote with pleasure from an editorial in the *N. Y. Med. Jour.*, May 4, 1912, "On Mineral Springs and the New Element, Niton":

In an article on the new element, niton, the so-called "Radium Emanation" of Rutherford, Dr. K. L. Hirshberg, of Johns Hopkins, states (*Scientific American*) that until Sir William Osler came along with scathing nihilistic words, and rid the scientific world of the delusion that the waters of lithia springs, sulphur springs, vichy springs, Carlsbad, and other watering places had the marvelous power of curing blood troubles, blood and constitutional diseases, there was hardly a physician in the civilized world who was not convinced of the powers of the particular waters of some particular springs to which he sent his patients.

But unfortunately for Osler's nihilistic views and fortunately for science, Monsieur and Madame Curie discovered radium, while subsequently other great workers in physical chemistry, including Thomson, Ramsay, Crookes and Rutherford, found traces of radium in the waters of many mineral springs.

Then followed the discovery by Sir William Ramsay not only of the fact that the wonderful properties of radium were due to the gas niton, of which it contained 75 per cent., but also that the curative value of the spring at Bath, England, was due to the niton that its waters contained.

We are thus furnished with an explanation for a phenomenon which has given rise to considerable speculation, viz., the fact that mineral waters that are prepared artificially, even though the formula of the bona fide spring is reproduced with the utmost care qualitatively and quantitatively, fail to produce the same effect as the waters of the original spring, especially when used at the spring itself.

The fact remains that it is now known that a powerful spray of tonic electrones underlies the therapeutic action of

at least certain mineral waters, and also that another of Osler's nihilistic doctrines is being rudely shaken.

Lowe, in the *British Med. Jour.*, says that radium emanations in mineral waters is credited with the following powers:

1. Great increase in diuresis and excretion of uric acid.
2. Increase in carbon dioxide exhalation 20 to 60 per cent.
3. Lowering of blood pressure, especially in arterio-sclerosis.
4. Decrease in the viscosity of the blood.
5. Great improvement in gastric and duodenal digestion.
6. Solvent action on gouty deposits.
7. The dissociation of uric acid and its salts into carbon dioxide and ammonia.
8. Inhibitory action in inflammation and relief of pain in rheumatism.
9. Increase in sexual vitality.
10. Considerable influence upon the sympathetic nerve affections.
11. Production of marked results in diabetes, albuminuria and glycosuria.

It is held by many that in this element is found the explanation of the therapeutic effect of many mineral waters.

Radio-active waters are now being extensively used with great success in England, Germany, Austria and France, in the treatment of rheumatism, gout, neuritis, neurasthenia, arterio-sclerosis, Bright's disease, diabetes, intestinal diseases, etc.

At the British Medical Association in July, 1911, Drs. Armstrong and Harburn, of Buxton, England, reported the results of their observation of over 6,000 cases treated by radium emanations. The results noted were, briefly, great increase in diuresis, great increase in carbonic acid exhalation, lowered blood pressure, especially in arterio-sclerosis. In diabetes, decreased sugar. In albuminuria, decrease of albumin and blood pressure, increase of body toxins by kidneys and lungs. In glycosuria, complete disappearance of sugar. In arterio-sclerosis, marked decrease of blood pressure. In gout, increase of volume of uric acid excretions, disappearance of uric acid crystals in urine, of pains, swellings and stiffness of affected parts. In arthritis, improvement in all forms.

Dr. Klemperer, of Berlin, an associate of Prof. His, says that he has never seen as good results from other treatment.

Dr. Wilke claims increase in the uric acid to 14 per cent. and of urea to 34 per cent. It seems to be an established fact that radium emanations penetrate every animal membrane and tissue, that it increases the activity of the digestive ferments,

regulates secretion and excretion, and that it exercises a potent influence on diseases of metabolism.

As many of the mineral springs of our country are radioactive, scores another point for our natural resources and for the *vis medicatrix naturae*. Priesnitz, a Silesian peasant (1828), was the pioneer who rescued hydrotherapy from the sleep of centuries.

"Priesnitz was such a strong believer in the efficacy of the water in disease and his success was so pronounced as to invite favorable investigation of the Austrian Government. The water cure which he established became the Mecca for European invalids, and some of his methods survive to-day.

"Priesnitz was followed by Oertel, Brand, Winternitz and Baruch, and these last two are regarded as the fathers of modern hydrotherapy.

"Coincident with Winternitz, the incontestable success of Brand in the treatment of typhoid fever compelled recognition from even the most myopic drug prescriber, and the truth of the ages has at last become the medical property of many countries."—Dieffenbach.

Priesnitz taught that the object of his curative methods were to expel the bad juices and replace them by good; the means used were water, air, exercise, diet.

Dr. Solis-Cohen, in his system of physiologic therapeutics, suggests that there should be maintained in every city an establishment to which any physician might refer his patients, with a definite hydriatic prescription, just as he can now send them to the apothecary with a definite pharmaceutic prescription.

Dr. Baruch in a letter to the writers says: "You are aware that I insist upon exact adaptation of the water treatment to the conditions and the reactive capacity of each individual case. It is to be regretted that physicians do not familiarize themselves with the technique and the action of the various procedures. You should invite your colleagues to your rooms and let them either take some treatments or see them administered. One or two visits would put them in possession of knowledge that would surely inure to their patients' and their own advantage.

"Here a warning against sending patients with arteriosclerosis to Turkish bath establishments may be in order.

Deaths have been reported as the result of entrusting these patients to the ignorant bath attendants. As I have long insisted, the cabinet hot air, or better still, the electric light bath, is far superior, because the patient may breathe cool and therefore unexpanded air, and may be refreshed and guarded against untoward accidents."

These warnings by Dr. Baruch are timely, and especially so as cases of tuberculosis have been contracted in Turkish bath establishments. Scientific hydrotherapy is well and ably taught in Germany, and most of their principal hospitals are equipped with modern hydrotherapeutic outfits.

Von Leyden, after speaking of the great value of physiotherapy, says that it should be utilized in the clinic alone, but it must become the property of the general practitioner.

Dr. Frederick Peterson, of the Vanderbilt Clinic for Nervous Diseases, says it is too well known that the administration of drugs, very valuable as they may be, and the employment of electricity are rarely sufficient, especially in nervous diseases, to effect a cure.

The water treatment certainly has many features that appeal strongly to a sense of rational treatment. For are we not thereby to affect very markedly the local innervation, to dilate and contract vessels, alter the circulation to a part, change the distribution of the blood of the whole body, weaken or strengthen the cardiac contractions, vary the amounts of secretion and excretion, increase heat radiation, etc.?

I could continue indefinitely, but why multiply? Scientific hydrotherapy will never be appreciated and come into its own until it is taught, and is correctly taught, by our medical schools, and not until they cease to graduate students who don't know the difference between a Scotch douche and a glass of Scotch whiskey.

Authorities referred to: Baruch's Hydrotherapy, Dieffenbach's Hydrotherapy, *N. Y. Medical Journal*, *British Medical Journal*, Prof. Platt, Harvard University.

Discussion.

Dr. Henry W. Frauenthal, of New York: I thought that some of the men who had not visited Hamburg would be interested in the use of hydrotherapy there. They have large tubs in which their cases that have met with extensive injury, like

railroad accidents, etc., with a great deal of trauma and laceration of soft tissues. The patient is placed in the tub and left there for weeks sometimes, to bring out the line of demarcation between the injured and healthy tissue.

There is a phase of this that is of value in a great many cases, and that is in these forms of extensive ulcer of the leg. I have had considerable experience in those cases. About twelve years ago I had a patient who had an extensive ulcer of both legs. After using aristol, iodoform and various other types of stimulation to the skin and finding that they destroyed the tissue, I asked one of the consultants of New York, Dr. Keyes, and he said it was the worst case of extensive ulcer of the leg he had ever seen. We took this man and placed his leg in a can of water and kept the temperature between 98° and 103° F. We kept this thing up for six months. He healed up nicely. Since then I have repeated that a number of times. I do not know of anything in old granulations which will act so much as a stimulant as keeping them in this hot water for a long time.

There is one thing in the use of water that I think most men overlook, and that is you have got actual pressure of water, and when you remove the limb from it you get a dilatation. The secondary dilatation is responsible to a great extent for the healing.

Dr. G. E. Pfahler, of Philadelphia: During both the visits I made to Hamburg, six years ago and three years ago, the water in use was kept at the body temperature, or just a little above it, and there was an automatic arrangement which kept the temperature at that point.

Dr. Frauenthal: We keep a little gas stove under it, and keep the temperature at 100° to 103° F.

Dr. William Benham Snow, of New York: The point Dr. Walton made, that the use of water in typhoid fever was for the reflex effects and not alone to lower temperature, I think is a good one.

He also referred to the quantity of water to be drunk in a day. I think quite a reaction has set in against the impression that large quantities of drinking water are beneficial, the tendency now being to make the quantity more moderate.

Dr. Walton's observations on hyper- and hypo-chlorhydria are interesting and new to me.

In regard to the comparison of the effects of water and electricity by Dr. Peterson: Dr. Peterson was once an active member of this Association, during which time he made some practical investigations, but he has failed to keep pace with the modern uses of the static and high frequency currents. His statements, therefore, are not based on the recent progress of physical therapeutics.

Dr. Slaughter, of Lynchburg, Va.: For a number of years

I did quite a large accident work. Most of them came to me in a very dirty condition. I made a practice, which I have never seen any other man use, not to scrub the wound thoroughly, but simply to clean it fairly clean with naphtha and sew it up if necessary, and then in twenty-four hours to soak it from five to ten minutes in warm water. Until I heard this paper I thought it was the cleansing action, but now I believe it was hydrotherapy. I had very few cases of sepsis. I took every case down inside of twenty-four hours and soaked it in warm water.

Dr. William T. Bishop, of Harrisburg, Pa.: In a considerable experience with injuries I considered hot water one of the most useful measures. In advising my patients to use hot water I tell them to get it as near the boiling point as they can. It has a sedative effect and also a stimulating effect, so that there is no question of its great value. I have used it in neighborhoods where there was great opposition. The doctors had an idea that cold water was a great thing for injuries. The same thing applies to sprains and contusions. The hot water is better.

Years ago people thought that they could drink too much water on account of its diluting the fluids of the body, but my impression is that you cannot drink too much water. It is the best thing to carry away the waste products of the system. Do not use water to float the food, but otherwise drink all the water you can.

Dr. Francis B. Bishop, of Washington: Unfortunately I did not hear Dr. Walton's most excellent paper, and I simply rise to ask a question in regard to this radio-active water. We have been hearing a great deal recently about radio-active water and its therapeutic properties. If the water is radio-active, is it not due possibly to a modicum of radium in the water, and if it is due to radium, is it a safe proposition to drink that water? Is it not possible that we may get eventually an accumulation of radium in our stomachs and intestines? I understand that Mme. Curie is dying from the emanations of radium.

Dr. Jefferson D. Gibson, of Denver: Mme. Curie is not the only one that is dying. I have a doctor under my care who is near death, suffering from what I call the reaction of normal tissue to long continued effects of the x-ray.

Dr. Rosa D. Wiss, of Meridian, Miss.: I wish to say that I am not from Missouri, but from Mississippi. I had heard a great deal about Dr. Walton's work, and I wanted to find out for myself. I came on about two weeks ago and put myself in Dr. Walton's hands. During that time I have had nine baths, and I never had anything to help me more. I was a little skeptical before.

Dr. Walton, closing: I appreciate very highly the full and free discussion of my paper. My experience is that my doctor patients are my most grateful and appreciative patients, and it is to be regretted that more physicians do not avail themselves and their patients of the great benefits that are derived from hydrotherapy.

To get a good working idea of hydrotherapy this subject should be carefully studied from the physiological standpoint, and I am sorry that the limited time at my disposal prevented my going more fully into this phase of the subject.

To regulate the amount of the water intake requires a careful consideration of the general condition, and especially so as to the blood pressure and the condition of the circulatory apparatus—the amount ranging from 6 to 16 glasses a day. People with low blood pressures can easily take the latter amount. The Japs are said to be the hardiest race in the world, and they drink from one to two gallons of water a day and they bathe frequently, thus keeping themselves clean inside and outside. Water is the great flusher and eliminator, and its internal use is just as important as it is externally.

It is just as vitally important and essential to keep your internal integument (the mucous membranes) clean as it is to keep the skin clean. I am glad that Dr. Snow emphasized this point about the use of water applications in typhoid fever, *i.e.*, that it is the reflex effect of water that is beneficial in the treatment of typhoid fever. This is important, as the prevalent idea obtaining among physicians, especially in using Brand's method, was that they were combatting the temperature and not the toxemias. I stated in my paper that the good effect of the Brand method was not for its effect on the typhoid temperature, but for its inestimable value in stimulating the dormant and sluggish nerve centers, and thereby enabling them to overcome the toxemias which were destroying the patient.

As to the uses of electricity as compared to hydrotherapy, I use both agents freely and I find them both equally valuable, and I would not attempt the practice of medicine without a complete modern equipment of electricity and hydrotherapy, with the judicious use of drugs and all other medicinal or therapeutic agents, trying always to use each agent in its place and according to their separate indications.

I appreciate Dr. Frauenthal's remark on the great value of prolonged heat in the treatment of severe injuries of the extremities. I recall the case of a brakeman falling off a moving freight train, his arm being crushed by the passage of the wheels over it.

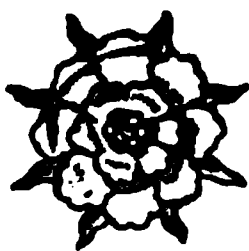
After molding the fragments into position the arm was kept for several days immersed in hot antiseptic solutions. The man made a splendid recovery.

Dr. Bishop, of Washington, asks if there can be any untowards or deleterious effect from the use internally of *radio active waters*.

If we are to accept the testimony of the most famous living scientists, Sir William Ramsay and others, the curative value of the most famous of the spas of the world, *i.e.*, Hot Springs Arkansas, Bath England, Bohemia, Austria, and others too numerous to mention, are due to their waters being radio active. As explained in my paper, the beneficial effects of these justly noted and famous mineral waters are due to the new gas niton which is derived from radium.

The very extensive use of these waters in the past, with the best of results, would certainly have shown if they had any cumulative or deleterious effects, and I can assure the good doctor that they are not only perfectly harmless, but that an occasional glass will not only be safe for him to take, but as variety is the spice of life, I feel sure that he will be benefited thereby.

Dr. Pfahler: I would like to add one point, in addition to what Dr. Walton said about pemphigus. It is a fatal disease, and the probabilities are that the patient would have died any way.



THE STATIC CHARGE; SOME FACTS AS TO ITS
NATURE, ORIGIN, LOCATION, ABSORPTION
INDEX, DIRECTION OF TRANSMISSION
AND DISSIPATION.*

BY CHARLES F. MILLS, M.D., SOUTH FRAMINGHAM, MASS.

An examination of a large number of text-books upon the subjects of light, sound, heat, motion and electricity leads one to the conclusion that the relation of these varied manifestations to each other has not yet been satisfactorily compared and explained. Many facts of absorbing interest are catalogued and numerous questions of far-reaching importance are asked. It is the purpose of this paper to draw attention to some of these queries, and to ask a few of them over again in a different form.

Without any presentation of the arguments in regard to the nature of electricity as to whether it is a substance or not, or as to whether there are two kinds or manifestations of it, we now proceed to the definition of the static charge which is under consideration.

A body which has been submitted to some influence that has changed its neutral condition into one in which a difference of potential has been created, either between two parts of the same body or between different bodies, is said to have been electrified. (D. C. Reusch.)

The phenomena of this electrified or charged body will vary according as the body is a conductor or a non-conductor of electricity. It must be kept in mind, however, that these terms are relative, and that no substance is a perfect conductor and that no non-conductor is a perfect insulator under all circumstances.

If a charge is produced upon a fountain pen composed of gutta-percha by rubbing it against woolen cloth, the charge will be confined to the end of the pen so rubbed, and it will not be conveyed to the other end of the pen, because gutta-percha is a non-conductor only inferior to glass or dry air. This is the result of an energetic contact. Both of the articles so brought together will be charged.

*Read at the meeting of the American Electro-Therapeutic Association, held at the Hotel Jefferson, Richmond, Va., Sept. 3-5, 1912.

In the case of conductors brought into contact there will be a charge produced without active friction, and both of these bodies become charged.

In either case the actual amount of electric energy stored up on either of these bodies, conductors or non-conductors, may be so small as to require an electroscope to determine the presence of the electrification.

Two bodies of the same substance but having different temperatures will demonstrate a charged condition. And it has also been shown that two bodies of the same substance but of different colors become charged when brought into contact.

Of two bodies so charged, one takes a charge which is dissimilar from that taken by the other body. For means of description, and until better terms can be found, one charge is called positive and the other negative. A charge cannot be produced upon one body without bringing forth another charge of equal quantity upon another body.

This power of one body over a second one is called induction, and the charge so produced is an induced charge.

The exact location of the static charge has been the subject of discussion. Is the charge confined to the surface or does it penetrate beneath the skin of the human body when in a state of electrification from the static machine? The answer is to be found in the relatively non-conducting or insulating skin and the excellent conducting nature of the tissues beneath the skin bathed as they are in a normal saline solution. It is sufficiently evident that so small a charge might be conveyed to the insulated human body as to remain entirely on the skin. If, however, the charge transmitted to the body be increased, there will be a point at which the normal resistance of the non-conducting skin will be overcome, and immediately the static charge will be no longer limited to the surface of the body, but will have charged every part of the anatomy with its peculiar influence. The application of a charged metal electrode to the skin at once diminishes its non-conductivity by increasing the amount of perspiration from the sweat glands, and so makes a better conducting medium through the sweat ducts to the thin walls of the blood capillaries.

The laws which govern electrostatics are obeyed only as the charges can be kept at rest and separate, for when they unite they form an electric current which will obey the same laws as any other electric current.

In electrotherapeutics, the charges are always allowed to unite. If the attempt should be made to keep them separate, such separation could not be maintained by reason of the high pressure of the charges and the chances for leakage. Consequently we have no longer to deal with electricity at rest, or static electricity, but with electricity in motion, that is, with an electric current. Much confusion has been caused by the idea that static electricity always remains static electricity, no matter whether it is in motion or not, and that in either case it is electricity of a kind different from that in an ordinary electric current and therefore subject to different laws. Static electricity as employed in electrotherapeutics has no value while at rest. Moreover, no one can prove that electricity resides only on the surface of a patient's body during any form of actual treatment, while every evidence tends to prove that the internal tissues are affected and traversed by the current. (D. C. Reusch.)

Such experiments as those made by Benjamin Franklin with Leyden jars, in which he demonstrated that the charge of the jar is not on the tinfoil but on the glass, do not contradict the foregoing statements.

The nerves of sensation supplying any given area of the human body cannot be defined as to their direction and distribution as the shortest distance between two points. Electrically speaking, the best conductor is the shortest distance between two points. When a metal electrode is applied over some spot sensitive to deep circumscribed pressure made by a finger tip and a static charge is slowly delivered at regular intervals, there is a painful sensation seemingly at the exact spot where the finger previously discovered the sensitiveness to exist. If the electrode is a large one in proportion to the amount of electric discharge, there may not be any particular sensation of pain even up to the full amount of current which the static machine is capable of producing. If, on the other hand, the surface of the electrode is small in proportion to the amount of the current passing, there may be a painful sensation resulting from a spark gap of less than an inch if the rate of interruption is a slow one. If the static charge is confined to the surface, why should not the pain be caused at the location of the lesion just as well as by the small electrode accurately applied over the painful spot? The small

charge would cause a stimulation of the sensory nerves of the skin, superimposing the pathological condition to a smaller number of sensory nerve endings than in the case of the larger electrode.

There is one argument which might be in favor of the theory that the charge remains external on the body, as is the case in an inanimate body, and that it is electric absorption. It is known that light, heat, sound, and electric vibrations are absorbed by the skin, but to what degree and with what import it is as yet not possible to state in regard to electricity and the accompanying phenomenon of fluorescence.

Drude has conducted a series of experiments with a view to the determination of the absorptive power of both organic and inorganic substances. For this purpose he employed an apparatus which gives waves seventy-two centimetres in length and having a frequency of four hundred millions a second. At this high frequency normal substances of small conductivity show no absorption. Organic compounds in general possess very small conductivity, and therefore if they obey the laws of normal absorption they will be non-absorbent with short electric waves.

Many substances are capable of absorbing the rapid ether vibrations of light. It is interesting to learn that matter can absorb the vibrations of a much greater wave length, such as those produced by an oscillating electric discharge. Both non-conductors (as the skin) and conductors (as the underlying tissues) may absorb these electric waves, the degree varying with the conditions. With conductors, the absorption is of a normal character, and it may be theoretically explained. With the non-conductors, the absorption is abnormal.

In order to compare the degree of absorption, an absorption index is used. This is a quantity which depends upon the decrease in the amplitude of the waves as they enter the medium. It can be theoretically calculated from the wave length of the electric vibration and the conductivity of the medium. In this connection there are two things to be taken into account—the dielectric constant of the medium and a wave length of infinity. A formula has been deducted indicating that the dielectric constant of the medium is equal to the square of the electric index of refraction waves of infinite length. With abnormal absorbents the square of the electric

index of refraction for waves whose length is infinity has always been less than the dielectric constant of the medium. Consequently the effect of change in the vibration period of the incident wave is contrary to that which is found in normal cases. Here it was found that a decrease in the wave length was accompanied by an increase in the absorptive power. Drude has shown that anomalous or abnormal absorption goes hand in hand with anomalous dispersion; that is to say, the refractive index decreases as the wave length decreases. Since absorptive power varies with the wave length it is necessary to choose a vibration of known period as a standard for the comparison of different substances. Hence the apparatus of Drude.

It is also known that in such cases a proportionately large amount of the absorption takes place in the integumentary layers, and that beyond these the absorption is very small indeed.

In 1888 Hertz produced electro-magnetic waves from the oscillating discharge of the Leyden jar, and even though some of them were several feet long and hundreds of millions of times longer than the longest wave length of visible light yet traveled with the same velocity as light waves and were subject to the same laws of reflection, refraction and polarization. To produce waves of the length of those of visible light we should have to use atoms or molecules of matter. So the general proposition has been reached that light waves are caused by the rapid vibration or oscillation of electric charges within the atomic or molecular structure, the oscillations being continuously maintained at a certain definite period corresponding to each wave length emitted. This is the conclusion reached by Soddy.

Smiles says that when matter is placed in the path of a ray of solar light, that it absorbs the energy of some of the vibrations and allows the remainder to pass on. Emergent rays give a spectrum having dark bands which indicate the wave length of the light which has disappeared, that is, it is an absorption spectrum.

Lemery, in 1709, maintained that phosphorescent bodies act like sponges to light, absorbing it and retaining it by so feeble a power that very trivial causes suffice for its extinction.

Fluorescence is not excited by light of every wave length,

but only when the incident rays contain vibrations which the medium is capable of absorbing. Fluorescence is the name given by Sir George Stokes to the phenomena which certain substances possess in altering the very short waves of ultra-violet light which are invisible, and transforming them into waves of longer length so that they become visible to the eye.

"A fluorescent substance might be termed a step-down transformer, or perhaps more correctly a frequency changer for light waves."

Stokes as a result of his investigations framed this law: "When the refrangibility of light is changed by fluorescence it is always lowered and never raised." In other words, the waves emitted during phosphorescence are always longer than those which are absorbed, thus causing phosphorescence. Light is propagated in straight lines. The white spark of the static machine is light. Are we correct in supposing that this spark is composed of converging rays of color in a fixed, unvarying, and regular order and proportion? Is the spark the result of the condensing action of the dielectric, the air? If so, it might give an explanation of the course of the electric forces which having been spread all over and within the body are suddenly concentrated or converged in the appearance of a white spark. Is this convergence caused by the dielectric, the skin, of a different conductivity and resistance from that which appertains to the tissues which it covers? Does this add anything to a clearer conception of why a pain is felt by the action of a concentrated static current passing through a metal rheophore to a nerve in a pathological condition? Is the pain the result of the resistance of the nerve being greater than that which the surrounding tissues offer?

Freund has proved by photometric experimentation that "the sum of the strength of the light reflected by a body and that of the light passing through it is less than that of the impinging light rays." According to the law of the conservation of energy, the force of absorbed light is not lost, but is converted into other forms of energy of equal value. A change takes place in the condition of the light-absorbing substance, and on the other hand those rays which are absorbed are the only effective ones.

White light is composite, as is shown by its spectrum. Is electricity composite?

Thomas Young writes that the difference between light waves and sound waves is that the sound waves vibrate in the direction of their propagation, that is longitudinally, whereas in light waves the ether particles move vertically to the direction of propagation, that is transversely. What is the manner of the propagation of electricity? There is a similarity to sound waves, as is shown in the case of a resonator. There is likewise a similarity to light waves as is gathered from the writings of scientists who are inclined more and more to the assumption that luminosity is brought about by the movements with and upon the atoms of their electrical charges, the electrons.

There is a resemblance to light in regard to the breaking up of white light into its primitive colors, which may again be gathered into white light by the condensing power of a lens.

The electric spark has a spectrum giving an impression of green and blue, varying in intensity. The brush discharge is red or violet. The former produces lines in the spectrum, and the latter, bands. The flash of lightning which is of the same nature as the electric spark of the static machine is able to show all the colors prismatically shown to exist in solar light.

The transmission of the charge is by contact or by induction, as in the origin of the charge.

The dissipation of the charge is chiefly if not entirely by leakage, that is the imperfect insulating power of the dielectric, air.

The question whether an increased understanding of the absorptive possibilities of the human organism in its relation to electricity, and whether if by methods not yet discovered this absorption by the body may supplement the efficacy of electro-therapeutics is one which at present cannot be satisfactorily answered.

Discussion.

Dr. William Benham Snow, of New York: I think we are very much indebted to Dr. Mills for this paper, because he has taken a great deal of pains in its preparation, and gone over the literature very carefully, and I think the facts he has brought out are very well in accord with the facts of many of us with reference to the passage of this current.

Absorption will always be interpreted very much the same as the action upon fluorescent substances. The action of a vibrating ray upon the cells is to produce vibration in those cells, which in some cases will be in the form of heat, in others will not produce heat. In that way the term absorption will be generally understood.

A more important question to me is that of the penetration or passage further than the surface, or whether the current stays on the surface altogether.

I think scientifically there is absolutely no doubt that this electricity is the same as every other electricity, except as to its condition, in the proportions of amperage and potential. It is very difficult to give any hard and fast reason why we get the mechanical effect from a static current that we cannot get from any other current. But the fact remains that it is so. The tremendous voltage of the static current is something that we too little consider. If light will penetrate through a bone, what will a high potential current do, with the great pressure it exerts? Bone is a relatively poor conductor, but it is very different from a non-conductor. It is going through a conducting medium, and it must pass with that tremendous potential. It is a displacement current. So that the current flow must take place through the tissues when the two opposite polarities are brought in such position that they determine the direction. Just so, when electrodes are placed on opposite surfaces it must pass through the medium. These are facts that are often controverted. Our neurological friends have gone on record as saying that it is always on the surface. Dr. Starr made that statement about twenty years ago, and I have heard Dr. Dana make it before a section of the Academy of Medicine. These statements were made honestly; but without an intelligent consideration of the characteristics of the static current and the manner in which it acts in conformity with the laws of high potential currents.

Dr. Jefferson D. Gibson, of Denver: It is just as difficult for the electrical fluid bottled up in the tissues to get back through the skin as it is to get in in the first place. So when you get a static charge and the electricity is forced through all the tissues of the body, and the charge is broken up, after the treatment is discontinued, a little of that electricity may be bottled up in the tissues. The skin would seem to be as able to hold it inside as it is to keep it from going inside. The amount must be infinitesimally small that is contained in the body, but there is some there I believe, and it probably acts more or less with the patient as a Leyden jar—the skin as the glass, and on one side of the patient is one pressure and on the inside of the patient a different pressure, with the skin between.

RESEARCHES ON THE RADIO-SENSITIVENESS OF
LIVING TISSUES.*

BY DR. DE KEATING-HART, OF PARIS.

Every luminous radiation which penetrates a living organism determines therein biochemical reactions which vary with the duration and the dose of the application, from a simple superactivity of the normal exchanges up to the destruction of cellular life; such is the common law which seems to govern the relations of the beings with light, or to some sort of vibrations which appertain to it. But the knowledge of the quantity, the quality, and the duration of the irradiations is impotent to pre-determine in advance either the intensity or the duration of these reactions; the diversity of the species and of the cellular conditions seem to bear an important part in the explanation of the inequality in the effects produced by irradiations which are quite equal. Every radio-therapist, no matter how experienced, has seen effects, produced by identical instrumentation and general conditions, which are unequal according to the individuals; and it has actually been demonstrated that in equivalent doses certain pathological tissues are much more sensitive than are others of the same kind to the action of the Roentgen rays. Since 1907 the labors of Bergonié and Tribondeau have cleared up in part the data which until that time were imprecise and empirical. Their researches upon the elective destruction produced in the depth of certain organs by radiations which spare the neighboring, and even the more superficial tissues have led these authors to establish the laws which permit us at least to comprehend a great number, even if they do not explain all the known facts. These laws are three in number and are as follows: "The x-rays act with greater proportionate intensity upon the cells,

1. When the reproductive activity of the cells is greatest.
2. When their karyo-kinetic future is longest (that is, more lasting, less interrupted is the movement of the nucleus which it makes toward progressive transformation and division).
3. When their morphology and their functions are less

* Translated from the *Revue des Agents Physiques*, Nov., 1912, by Dr. Eden V. Delphey.

fixed." Without the necessity of referring to the specific anti-cancerous actions of the rays, or to the peculiar fragility of the pathological cells, these laws explain very simply, *a*, The elective destruction of certain neoplasms obtained by the rays deep in the centre of tissues, while sparing adjacent healthy tissues; *b*, The great radio-sensitiveness of certain tumors of rapid evolution. (These present with a special intensity the characteristics described by the laws of Bergonié.) It is desirable to compare these data with the conclusions of Dominici and Chéron, which later established the order of the sensitiveness of tumors to radium-therapy and which is an anatomico-pathological verification of the laws announced above. In effect, they recognize not only the greater fragility of the sarcoma over the epithelioma, but also of the embryonic sarcoma over the fibro or the chondro-sarcoma, neoplasms which are in part composed of cells whose morphology and functions are more fixed than are the embryonic cells. Also the researches of Schwartz upon the radio-sensitiveness of vegetables to the x-rays have permitted this author to determine the extreme fragility of moistened and germinating seeds and at the same time the lesser fragility of other seeds of the same kind, previously dried; a double observation which tends to conform the laws emitted by the school of Bordeaux. And yet, how shall we explain by these laws the extreme sensitiveness of the skin of certain patients to a radio-dermatitis either immediate or late, following relatively slight exposures? How can we explain the unexpected resistance of extremely radio-sensitive tumors to Roentgenian treatment at the beginning, and then, by a contrary phenomenon, in the course of repeated irradiations, a more or less manifest fragility of the cutaneous envelop is acquired? Idiosyncrasy has been given as an answer to explain the exaggerated sensitiveness of certain skins. While this word serves more to hide our ignorance than to clear up our doubts, it is not sufficient to explain the other facts observed. Really the cellular quality of a given tissue, either normal or pathological, does not explain the diversity of its reactions which attack it, since without apparent change of conditions the reactions in the same tissue may be very much increased or diminished. There are therefore times or rather biological states wherein certain of these tissues, ordinarily sensitive, cease to be so, cases where cells which have been resistant suddenly become more susceptible. It is for the purpose of determining the causes and conditions of these changes that I have conducted these researches. As stated, it is the young cells, cells where the karyokinesis is the most intense, which are the most radio-sensitive; this was shown by the researches of Bergonié and Tribondeau, and confirmed by those of Schwartz upon the sensitiveness of germinating seeds to the x-rays. We have

also stated that the clinical anatomo-pathology gives a new support to this thesis, because according to Dominici and Chéron these are the tumors with embryonic cells which the radium rays destroy the most easily. Moreover, in radiotherapy we know that sarcomata are more easily cured than are epitheliomata. The fact therefore appears indisputable and we ought to admit it. But the embryonic are not the only fragile tissues. A traumatism suffices to render a cutaneous surface very radio-sensitive within the exact limits of the region injured. Faradic electrization and the continuous current produce the same effects. On the other hand, Gerhartz informs us that contrary to what has been proven in the higher animals, the genital organs of frogs exposed daily to intensive action of the x-rays are neither arrested nor retarded in their development. The karyokinetic character of a tissue is therefore not sufficient, according to these experiments, to produce radio-sensitiveness, and the law of Bergonié and Tribondeau is shown to be wanting. How can we admit the explanation offered by Gerhartz that there is an exception to the law in the reactions produced in the lower animals, when we see it verified anew in organisms placed much lower still in the scale of life—the vegetables? That is a physiological anomaly which is rather singular, and which the general unity of natural laws will scarcely permit us to believe. Schwartze, moreover, brought a new element into the problem. He admits that the intra- and extra-cellular tension has a part in the phenomena, and he thinks by complete desiccation of the seeds to render them absolutely resistant to luminous waves. But his experiments seem on this point to be invalidated by those of Paul Becquerel, who destroyed the spores of moulds previously deprived of all liquid impregnation in a vacuum by a simple exposure of two to three minutes of the ultra-violet rays. According to the experiments of Becquerel, it is not so much the moisture as the cold which modifies the resistance of the spores to the radiations, because an exposure of two or three minutes to the very low temperature of liquid air serves to raise the duration of their defensive resistance to six hours. We see therefore in two ways that cold renders less fragile the living elements exposed to noxious lights, in animals of variable temperature on one hand, and in vegetables made extremely cold on the other hand, and this leads me to the theory which crowns my researches.

The peculiar quality of all germination, of all karyokinesis, is that it is produced only at a certain mean ambient temperature, fixed for each species, and at the same time the raising of the intra-cellular temperature more or less above that of the ambience. To lower this external temperature is always at first to lessen the multiplication, then to arrest it according to the

rapidity and intensity of this abasement. Heat is the condition par excellence of all karyokinetic activity. It is necessary to determine whether it is the temperature or the youth of the cell which makes it fragile to radiations; or, in other words, if the variation in radio-sensitiveness in every cell does not follow changes in heat whether it be young or not. In order to discuss such a hypothesis, we must at the outset examine the effects of cold, followed by those of heat upon cellular radio-sensitiveness. The examination of the experiments of Paul Becquerel cited above is of such a nature as to indicate the preponderance of heat over cellular youth as a causative factor. Dried spores are deprived of their reproductive qualities, and present the same appearance of youth at the ordinary temperature as when submitted to an intense refrigeration. Becquerel learned that the spores of *aspergillus niger*, of mould, and of brewers yeast, dried in a vacuum, acquired a resistance to the ultra-violet rays 120 times greater at the temperature of liquid air than at ordinary temperature. Therefore cells of identical quality react in a different manner at different temperatures. It may be objected that the laws which govern the reactions of the ultra-violet rays are not the same as those which govern the biological effects of the x-rays. But this objection cannot be made to the researches of Gerhartz upon the reproductive organs of frogs, especially as these experiments have been repeated even at the time of spawning, when they should hardly have been influenced thereby. This shows that the young cells of cold-blooded animals are much less radio-sensitive than the same cells in the mammifera. The difference in the size of the animal cannot be considered, unless there is a difference in the cellular structure, because Regaud related at the Congress at Lille the identity of the effects of the radiations upon the spermatogenes of the cat and upon those of the rat, although these animals are very dissimilar both in form and volume. In his experiments upon germinating and non-germinating seeds Schwartze concluded that their radio-sensitiveness was in direct ratio to the amount of their metabolism, and from them he arranged a radio-therapeutic technique which, after him, Schmidt has applied with some success; he compresses the healthy cutaneous surfaces over the tumors and believes that in this manner the skin acquires a double or triple resistance to that which it ordinarily has. I do not deny that such a result may be due to the compression, but it seems to me that before we admit it as indisputable we ought to eliminate from the problem certain causes of error. To begin with, is there not a possibility that there are metabolic activities in the germinating state which distinguish seeds in karyokinesis from seeds in repose? Do we not know that it is not only necessary to moisten the seeds to cause them to germinate, but that there is also a certain ambient temperature necessary for their de-

velopment? And, above all, do we not know that cellular mitosis alone suffices to elevate the temperature of the tissues several degrees? May not the great radio-sensitiveness of germinating seeds be justly due to the internal heat of the seed in fermentation, and should we not examine the possibility of this second cause before attributing such an effect to the variations in the alimentary exchanges alone? On the other hand, if it is well demonstrated that compression of the tissues suffices to give them a resistance greater than normal, it will be necessary to prove also:

1. That no part of the cutaneous protection is due to the compressor elements filling the role of a filter and arresting the very soft rays.

2. That the suppression of the circulation thus obtained does not produce a slight cooling in the tissues compressed.

3. That the enveloping compressor does not fulfil the office of a veritable screen between the skin and the heated anticathode, thereby arresting the heat radiating from it. In effect I have noted a temperature of 50 in the localizer a few centimeters from the tube; may it not be the slight heating of the skin in contact with this air that facilitates the dermatitis? And, on the contrary, may not a screen arrest these heat waves and thereby retard a dermatitis? It may well be that it is not the exsanguinated state of the tissues but their low temperature which explains the relative radio-insensitiveness observed by Schwartze and Schmidt in the integuments compressed; and the observations of the former upon the fragility of moistened germinating seeds may on the contrary find a very simple explanation in the constant elevation of their thermic degree. Schmidt also investigated the radio-sensitiveness of the tissues due to Bier's hyperæmia, and he demonstrated an effect which to me is very conclusive, that active hyperæmia exaggerates their fragility, and that passive hyperæmia augments their resistance. Naturally, the explanation is in the cellular superactivity in the first, and in the karyokinetic arrest which occurs in the second. Besides since this arrest seems not to have been absolutely proved, another explanation may be given which seems to be quite as rational. It is: *a*, That at the periphery of the body the arterial blood is at a higher temperature than the venous; *b*, That active hyperæmia of Bier is often obtained by thermic means, and that, on the contrary, it is not rare that in the members where the venous circulation is relaxed there is a cooling. This fact has been well observed by Bier himself, and he recommends that in order to succeed in this therapeutic measure, one should watch so that it does not occur. Therefore the experiments of Schmidt do not contradict, but on the contrary tend to fortify the thermic hypothesis of radio-sensitiveness. Before leaving these purely experimental proofs, let us recall a comparison which seems to me to be not irrational, the care which is taken

in Finsen's method to suppress the caloric rays and to permit only the chemical rays to pass into the tissues.

We shall now see that clinical observations as well as pure experimentation are of a nature to justify our hypothesis. As we have said, the sarcomata, especially embryonic sarcomata, are singularly radio-sensitive. Now do we not know that certain of these neoplasms, especially sarcomata of rapid evolution, have a higher temperature than that of the surrounding tissues? * Is it necessary to recall also the high temperature of the spleen situated in the abdominal region, where the venous blood is warmer than the arterial blood (schema of Bergonié) and the intense sensitiveness of spleno-megalias to radio-therapeutic treatment. To these generally well known facts will be added those which appertain to my personal clinical experimentation. A patient affected with a cancer of the eye extending into the cranium had, before coming into my hands, undergone radio-therapeutic treatment by an expert specialist. Each seance was followed by a violent radio-dermatitis of the locality treated, notwithstanding the doses applied were very feeble. After several attempts the patient refused on principle all radio-therapeutics, and for a long time hesitated to submit to a new trial with me. Now, having taken the precaution to moisten the surface treated with a little water and hastening the evaporation with a current of air, thanks to the cooling thus obtained I was able to subject the patient to repeated seances of 6 H. without the least cutaneous reaction. This experience repeated in another analogous case has given me the same result. The following observation was made by accident: In the course of thermo-therapeutic applications for a metastatic cancer of the breast, I plunged the diathermic needles into some nodules strewn around the principal lesions. Two of them thrust each into a small presternal metastasis reposed by their extremity upon the neighboring skin, and the respiratory movements of the patient displaced them from time to time. Once after withdrawing the needles I applied the x-rays upon the surface treated. Some days afterward I was surprised to see, upon the same region, the appearance of five fine lines of radio-dermatitis converging towards the two points where the needles penetrated. Upon examination, I found that these lines undoubtedly represented the successive positions upon the skin which the heated needles occupied upon the skin during the respiratory movements. Yet these lines were not there when I withdrew the needles. It was therefore the x-rays which had etched these diverse places as represented by a dermatitis, upon locations preliminarily sensitized by the heating. Nevertheless, there is one objection which may be

* Estland and Verneuil cited by Poulet and Bousquet, *Traite de Pathologie Externe*, Tome, I, 1885.

urged to this interpretation: may it not have been the low-tension high-frequency currents which employed for the heating which sensitized the skin affected, rather than the heat itself? I do not absolutely wish to claim that the currents may not have been a contributing factor, but the following experiences seem to me to give the preponderance to the thermic action alone: A man affected with general lymphosarcomatosis, and whose case I have already published, had been treated with results which were slight and of short duration, by the aid of the x-rays. He was a very sick man when I first saw him with large tumors in the groins, arm-pits, on the neck, abdomen, etc. In my turn, I treated him with thermo-radiotherapy with a constant and durable success. Now I have obtained identical effects since I have raised the internal temperature either by means of high-frequency currents or by the aid of injections of serum at 50° C. at the moment of irradiation. It was the heat regardless of its source which radio-sensitized the tissues. On the contrary, do the currents deprived of their caloric action produce the same effects? No, because it appears that it is only necessary to chill the surface of the skin submitted to irradiations, while diathermic currents are traversing the tissues, to suppress all radio-dermatites, and that with doses very much greater than those which are usually considered to be productive of an erythema. Here is an experiment which every radiologist can reproduce at will: if the x-rays are projected upon the skin traversed by high-frequency currents, with 5 H. units, it will certainly provoke the formation of a dermatitis having exactly the form of the electrode through which the currents entered. And yet this effect can surely be prevented if the precaution is taken to refrigerate the surface. This final fact tends to confirm the caloric origin of radio-sensitiveness: a warm poultice produces the same effect as the electrode in heating the surface of the tissues; and the x-rays will reproduce upon the skin a dermatitis the exact size and form of the poultice just as it does that of the electrode.* From these facts, it is evident therefore that high-frequency currents, deprived of their caloric action, are incapable of sensitizing the tissues to any apparent extent, and that heat, independent of all electrization, clearly suffices to do so. And that leads me to formulate here the law which it seems to me governs the sensitiveness of cells to all radiations: *All other things being equal, the radio-sensitiveness of a living tissue is a function of its temperature.*

This law being stated, I shall show by clinical reports in a later work the beautiful results which I have obtained by the application of this principle, and I shall also explain the technique which I believe should be employed.

* Personal experiments.

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M.D.

Electrolysis in Hemorrhoids. By Frederick H. Williams, of Boston, gives an interesting technic of this treatment in a paper on "Electricity in Rectal Diseases; a Neglected Resource in Their Treatment," in the *New York Med. Jour.*, April 26, 1913. Dr. Williams' description of his technic is preceded by his account of that of Sir Charles Ball, as follows:

"Sir Charles Ball was one of the later investigators to recommend the use of electrolysis for internal hemorrhoids. Ball's technic was surprisingly simple. After bringing the hemorrhoid into view, it was painted with a four per cent. solution of cocaine. In five or ten minutes the parts were insensible to pain, and four or five sewing needles, attached to the negative electrode, were passed into the tumor and allowed to remain until the tissue turned white. This procedure was found quite painless, the patient was not confined, and there was entire absence of ulceration or other complications. After employing electrolysis in the treatment of internal hemorrhoids for over ten years and observing its many advantages over surgical measures, I am led to wonder why the recommendations of Ball in this regard were not heeded long ago, and the method acknowledged to be the preferred treatment for uncomplicated cases.

"The technic I employ may be successfully carried out in the office, and differs somewhat from that of Ball in permitting more exact control of the electrode, making thorough illumination possible and rendering accidental short circuiting through the speculum unnecessary. Pain is almost entirely eliminated, and a single application of the current effects a cure in ordinary cases. The patient needs very little preparation before treatment. A cathartic twelve hours and an enema one hour before coming to the office, to prevent any interruption or delay during treatment. After the usual antiseptic cleansing, the patient is placed in the Sims position, a short proctoscope is passed, and the hemorrhoid is brought into view. Unless the sphincters are contracted, it is not necessary to dilate them. I prefer a three-inch beveled proctoscope, which is easy to insert and satisfactory to operate through. If the tissue to be treated is confined to one side, a Hirschman oblique anoscope is useful. With these instruments it is possible to retain the hemorrhoids in view as long as necessary to carry out this plan of treatment without tiring the patient.

"The choice of the syringe and the local anesthetic is an important consideration. Any one of the many anesthetics,

such as cocaine, hydrochloride and beta eucaine hydrochloride or lactate, may be used, but the percentage strength should be very low, because, first, the solution does not ooze away as in cutting operations; second, a larger quantity of fluid is necessary to get pressure anesthesia than when injecting under the skin. This is due to the greater elasticity of the mucous membrane and to the absorbent capacity of the loose cellular tissue about the rectum. Solutions of one-tenth of one per cent. to one-half of one per cent. are sufficiently concentrated to obtain perfect anesthesia. Beta eucaine lactate has the advantage of remaining stable upon being boiled and is reputed to be less toxic than cocaine. The syringe of choice is an all metal, three-ring syringe of two drachm capacity, with a curved extension piece and a very small needle, to facilitate thorough infiltration without causing pain. The hypodermic injection should be made from the base to the apex of the hemorrhoid. When the tissue is distended and has a blanched appearance, the tumor is ready for treatment.

"The stock electrodes upon the market are a disappointment to those who hope to do superior electrolytic work. They are coarse and awkward to handle, and often obscure the proctoscopic view completely. I have had made for my special needs ten-inch monopolar platinum electrodes, having three points arranged in a row. These slender electrodes permit good illumination; they do not interfere with vision, but facilitate carrying out the smallest details of this method of treatment. When the pile tumor has been injected and is no longer sensitive, the electrode should be passed into its centre, and its position changed from time to time until disintegration is complete. It should be remembered never to interrupt or make contact during a treatment without first turning the rheostat to zero. A current of five to twenty milliamperes, slowly turned on and continued for five or ten minutes, is usually sufficient to treat a single hemorrhoid. The exact time required will depend upon the size of the pile tumor, the strength of the current, also the resistance in circuit. As soon as the current is turned on, bubbles of gas form in the shrinking tumor, giving it a grayish white color. The resulting chemical effect is that of dissolving albuminous constituents, causing electrolytic decomposition of the salts contained in the tissues, and inducing molecular disintegration. If this technic is followed closely, it will not be necessary to repeat the application, although further treatment is not contraindicated where the first application proves insufficient. Antiseptic precautions are not to be forgotten, although this is not so necessary, as the electric current itself has an antiseptic and bactericidal effect."

The conclusions are as follows:

"Electrolysis is a safe and painless method of treating all cases of varicose internal hemorrhoids.

"Patients are not confined to the room or detained from their usual duties while under treatment, except in extreme cases.

"Weak and aged patients who are unable to take a general anesthetic stand electrolytic treatments admirably.

"Electrolytic treatments are not so easily given as electro-cautery treatments, the former requiring more time and more exactness of technic.

"There is no hemorrhage during or after treatment.

"Ulceration, stricture, fistulæ, or abscesses have never been observed as a sequel to this method.

"Records covering a period of ten years after treatment indicate that cures are permanent."

This interesting paper should induce proctologists to employ electrolytic surgery more frequently in their work. The facility of its use without general anesthesia is but one of its advantages, an even more important advantage being the total absence of abnormal post-treatment conditions.

The subject of the technic should be of particular interest to electro-therapeutists. Taking this up point by point:

Method of Exposure of Internal Hemorrhoids. A hard rubber speculum, particularly a spiral, fenestrated, conical instrument, would expose the hemorrhoid readily without risk of current deflection.

Local Anesthetic. Injection of the anesthetic may be dispensed with, with risk of constitutional effect, by applying powdered cocaine directly to the moist surface and waiting a few minutes before inserting the electrode.

Choice of Polarity. The negative pole seems to have been employed by Dr. Williams. This is unusual, but seems to have been effective. It should be tried out in comparison with the more usually employed positive. When used, the elaborate electrode described is unnecessary; a long knitting needle sharpened at the point, insulated with hot wax, and with fine wire twisted about the proximal end would be equally effective and scientifically correct.

In my own method, as described elsewhere,* the positive pole is used with a sharp pointed zinc electrode, cut very light and of only sufficient length from a thin sheet of zinc, suitably insulated with melted sealing wax. The instrument is self-retained, and its insulation limits the surface action somewhat.

* *Ionic Surgery in Cancer*, A. L. Chatterton Co., New York.

An entirely different question is the possibility of avoiding all surgical intervention in some cases, even electrolytic, and the employment of high-frequency or the wave current. The results are excellent in a few selected cases, particularly if a teaspoonful of whole mustard seed be swallowed by the patient after the chief meal.

G. B. M.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M.D.

"Bathing."—Every now and then some individual arises to propound the doctrine that the *genus homo* should not use the daily ablution for the purposes of cleanliness. These cases as a rule claim that the use of the flesh brush or some other mechanical method will remove the dry and dead epithelium covering the surface of the skin, and in this way accomplish all that is desired. How anyone can entertain such an idea, provided they know anything of the anatomy and physiology of the skin, baffles belief.

The skin as an eliminant organ throws off a good deal of waste material, both in health and disease. The outer layers of the epidermis are constantly drying the multitudes of sweat and sebaceous glands pour out their excretions and secretions upon the skin surface where the watery constituents are duly evaporated, leaving a proteid-oleagenous coating that is extremely subject to decomposition and putrefaction. There is no question but that it would be best to remove any putrefactive substances from the surface of the skin, not alone for the benefit that arises to the individual himself, but from an esthetic standpoint as well. Modern growth, with its many complications and the crowding of individuals close to one another renders it absolutely necessary that we should at least consider the feelings of our fellowman, to say nothing of living up to the accepted ethics of a community.

We are undoubtedly of the opinion that the human being can get along and do fairly well without the need of bathing, but this is done at the cost of cleanliness, healthfulness and the expense of his neighbor's olfactores. There is no question but that every human being is bettered by the daily bath; a moderate and reasonable use of soap is a necessity in these

modern days of soot and dust, which add to the already accumulated substances on the skin surface.

He who takes a hot bath, followed by a cold shower or plunge bath, is undoubtedly a better individual, mentally, nervously and physically, provided, of course, that the bath is not unadapted to his condition, should he happen to be sick. The skin is in reality a dirt catcher, and needs cleansing by the somewhat simple process of bathing.

The writer, from many years' experience in the treatment of chronically invalided human beings, has found nothing to take the place of hydrotherapy, and it is to be regretted that more people do not avail themselves of this method of treatment, with water everywhere, both hot and cold, and soap so very, very cheap. We believe that a following after false gods, the giving up of a time-honored and necessary daily method is fraught with danger and tends to lower the general status of a community. Therefore we should bathe frequently, bathe sensibly and bathe intelligently. It will make you feel better, and the psychic effect of knowing that one is absolutely clean, and we might say presentable, reacts upon the individual and helps his mental and moral nature. C. P.

Water and Water Supplies. By Ralph Oakley Clock, M.D.

Dietetic and Hygienic Gazette, March, 1913.

The writer says that absolute water does not occur in nature; that it is a laboratory curiosity, and pure water, as we understand it, means water free from its harmful and unwholesome ingredients. In obtaining a water supply, we should try and get it in its purest form, free from dust, soot and the gaseous and aqueous vapors of a polluted atmosphere. Surface water is more likely to be polluted than those that have passed through the ground, but nearly all water carries with it some soluble organic matter. Pure water should be clear, bright and sparkling, although this is no evidence of its purity, but it indicates a freedom from organic and mineral matters. Milkiness is often due to white clay. The color of water is usually determined by the surface of ground with which it has been contaminated; its reaction is usually alkaline and has no odor. Its taste usually comes from the gases, and it is a well-known fact that taste is no guarantee, for waters containing the oxidation products to sewage are often remarkable for their unusual palatability.

The gases usually present are oxygen, obtained from the

atmosphere. Water is frequently aerated by the particles of dust falling in it and carrying oxygen. Carbon dioxide is derived partly from the air and partly from the soil, where it is present in abundance. "Hardness" is ordinarily due to the character of the soil, the water having come in contact with rocks, which hold lime and magnesia; when the water is soft it has probably passed over aluminum and silica; sometimes sand-stone waters are soft. Hardness causes a great waste of soap. In addition to this the water may be contaminated by bacteria. As a rule wells are risky and springs, while they are believed to be pure, but in fact they are subjected to the same pollution of any ordinary water. The article is an interesting one, and gives many facts with which the physician should become acquainted.

Methods of Water Purification for Large Cities. Rudolph Hering, New York. *Journal American Medical Assn.*, February 8, 1913.

The growing importance and necessity for a thorough and comprehensive knowledge of the methods of purifying water has doubtless led to the appearance lately of a great number of articles on this subject, many of which have been reviewed in the columns of this journal. The writer says that when the water is more or less strongly polluted with sewage, the preparatory treatment should endeavor to remove all pathogenic bacteria, so that they may not enter the pipes, there perhaps to be nourished. For this purpose coagulation and precipitation are quite effective, because the descending and depositing solid parcels carry with them to the bottom a high per cent. of bacteria, just as rain drops clarify a dust laden atmosphere. There should be a preliminary course of filtration, and the final filters that are used should be capable of removing bacteria. If the water is allowed to stand a bacterial slime may form on the upper surface of the sand surface, and to some extent on the sandgrains some distance below. This slime acts as a strainer through which the water passes, causing clarification. It is needless to add that the importance of proper sewerage, precipitation, filtration and the final purification of the water before it enters the mains is a subject in which every citizen is perforce interested.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

The Prophylactic and Therapeutic Value of Fresh Air in Schools and Hospitals, Including Heliotherapy. By John W. Brannan, M.D., *Medical Record*, June 7, 1913.

This excellent paper should be read with profit. It shows

in the first place that with proper clothing that we can get very near to nature in the treatment of tubercular patients, and that it is not necessary that they go to Switzerland for sunshine or the seashore. It is encouraging to see what can be accomplished by roof garden schools and boats.

In this paper heliotherapy comes in for very favorable notice. The children are stripped in order to expose the parts diseased to the direct rays of the sun, and the exposures are kept up as long as is thought best. The benefits have been thoroughly demonstrated. The author calls attention to the fact that when there is no sun for several days, resort was had to radiotherapy. This one point especially the editor of this department would emphasize. The value of sunshine has been known and made use of for centuries. From time immemorial the ancients of Greece and Rome sent many of their invalids into sunny Egypt. So if the rays of the sun now are considered so important, and the rays are especially directed upon the parts affected, why should not the x-ray in proper doses be many times more valuable to these affected joints than ordinary sunshine. The x-ray will produce more pronounced effects than long exposures to ordinary sunlight, and with less danger from the exposure. The great bugaboo that is made of radiotherapy (x-ray burns) in this time of better understanding of its properties and management prevent the use of the x-ray in the treatment of all tubercular conditions. The dangers are eliminated under its judicious employment in these conditions, and the results are very satisfactory. Sunlight is a great foe to tuberculosis, but the x-ray is the nearest a specific we have in advanced tuberculosis.

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERIC DEKRAFT, M.D.

The Value of Low Frequency or Leduc's Currents. By Dr. S. C. Damoglon. *London Lancet*, April 26, 1913.

The writer states that obesity is very frequent in Egypt, on account of climatic conditions and the sedentary and inactive liver of the upper classes. Men with extremely prominent abdomens, as large as, and even larger, than those of women in the later stages of child bearing, are a very common spectacle in the streets of Cairo. The possessors of such bulk are usually proud of it. Occasionally, however, corpulent patients ask to be relieved of their infirmity. A patient suffering from dilated stomach, which could be traced to below the umbilicus, came under treatment March 30, 1911. Leduc's currents with electrode cushions were applied daily for ten

minutes. On the twelfth day the patient's stomach symptoms were ameliorated. A loss of four kilogrammes was noted, and his abdomen had so diminished in volume that his trousers were much too large.

Since then three further cases were treated by this current of feeble tension, and perfect regularity interrupted rhythmically and precisely.

I. S. P., Oct. 28, abdominal girth 1.10 meters (3 ft. 8 in.). A low frequency current of 40 to 60 milliamperes was applied Aug. 1, 1911. Energetic contractions of the abdominal muscles without any unpleasant symptoms were obtained. Duration of treatment fifteen minutes daily for six days, then three times a week. After twelve applications the abdominal girth had diminished (8) centimeters (3 inches).

II. A. H., aged 40, girth 1.16 meters (3ft. 10½ in.), began treatment Aug. 8, 1911. After ten daily treatments a diminution of 10 centimeters was noted.

III. M. T., aged 55, gouty, weight 105 kilos, girth 1.2 meters (4 ft.), began Aug. 11, 1911. After twenty applications a reduction of 12 centimeters was noted.

There appears thus to be at our command a variety of methods by means of which we may obtain rhythmical muscular contractions in the treatment of obesity. Dr. Humphries described Bergonie's method of faradization, with a secondary of coarse wire and large electrodes. Many large muscles can be stimulated to vigorous action of an intermittent or rhythmical nature. Dr. Humphries' paper appeared in a previous number of this journal.

Dr. W. Hampson described some results which he obtained by this method (before the Royal Society of Medicine). The contraction of a muscle squeezes out blood from the veins, the action of the valves securing the passage in the right direction—towards the heart. The next relaxation of the muscles allows the veins to fill again from the minute veins and capillaries, and to receive a much larger charge than if the veins had not been emptied by the previous contraction. Each succeeding contraction and relaxation produced by a pulsatory current causes a repetition of these processes. The muscle thus maintains a flow of blood towards the heart. It becomes a modified heart.

When these intermittent contractions are applied simultaneously to most of the large muscles of the body, a large part of the body is converted into a pump which, while assisting the blood stream in its natural course, creates in the veins

waves of pressure and movement at the rate of 100 per minute or more.

If these contractions be as nearly as possible synchronous with those of the heart, they reinforce the action of the heart.

If the electrical interruptions be made definitely slower than the heart beats, the latter will, if the disparity be not too great, be brought into conformity with the former so that the pulse rate is lowered.

In cases of weak and excessively rapid hearts the treatment appears to give benefit in three ways:

1. The improvement in the circulation beyond what the unaided heart is capable of maintaining, increasing the pressure on the right side of the heart and diminishing the resistance against the free flow through the capillaries, improves all the functions of the body and the general health. By giving better circulation through the lungs, it relieves distress and difficulty in breathing, whether due to faults which are primarily in the lungs or the heart. Thus some of the most powerful stimuli to excessive action in a weak heart are removed.

2. The heart shares in the increased nutrition, due to improvement in the circulation.

3. The heart is relieved of some portion of the muscular effort necessary to maintain the circulation, so that a great amount of circulation work is done while the heart is in a partially resting condition. The treatment may be looked upon as the conversion of the large muscles of the body into a subsidiary heart.

In delicate heart cases the contractions must be kept at a minimum. The smallest contractions are sufficient to move the blood.

Those who have not the Bergonie apparatus may obtain very similar effects by utilizing a slow sinusoidal current. The wall cabinet of Wappler is particularly well adapted to this. There are also other good sinusoidal apparatus on the market.

A most valuable means for producing rhythmic muscular contractions and relaxation is the inducto-resonator attached to the static machine. With this we can cause entire groups of muscles to contract *en masse*, as well as produce a peculiar contraction of individual muscular fibres within the contracting muscle.

We have the rate of contraction entirely at our command through our ability to cause the revolving plates to move rapidly or slowly.

The depth of penetration is also at our command through our ability to regulate the potential, by increasing or diminishing the length of spark at the exploders.

This resonator effleuve is essentially a pulsatory current of very high potential, a powerful muscular and vascular stimulant and exciter to active metabolism. Cases of obesity have lost much in abdominal girth, in bodily weight, when subjected to a daily treatment. Their muscles have also been made strong and pliant as the proverbial steel spring.

In diabetes much improvement in health and strength as well as reduction in sugar excretion has been the rule.

In auto-toxæmic joint pains and the frequently accompanying nervous depression it has proved to be a valuable aid.

More recently it has been the privilege of the editor of this department to see cases of very low blood pressure, in some instances as low as 70 to 80 millimeters, respond valorously to the application of the resonator effleuve from an inductor-resonator, fed by a ten-plate static machine, for twenty minutes every other day.

In these cases there was a peculiar mottled appearance of the skin due to dilatation of the veins. In one case there was a marked tenderness on pressure along the anterior tibial nerve and some foot-drop.

All were cases of mental depression.

The blood pressure rose in a few weeks to the normal, the general bodily nutrition improved most rapidly and the mental depression also.

F. DeK.

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

Electrical Operative Treatment for Diseases of the Skin and Mucous Membrane. By W. Knowsley Sibley, A.M., M.D., London, Eng. Abstracted from *The Urologic and Cutaneous Review*.

The author speaks of the rapid progress and the great changes which have been brought about by the introduction

of completely new methods of treatment. The only hope of cure for many cutaneous diseases a short time ago was extirpation by the surgeon's knife, while most of these diseases can now be cured more satisfactorily and permanently by such electrical treatments as electrolysis, ionization, high-frequency currents or x-rays.

He goes on to describe the *modus operandi* in the case of naevi, moles, superfluous hairs, etc., which is generally known and unnecessary to describe, but he goes on to speak of the removal of small simple tumors, such as sebaceous cysts, which is of quite recent introduction. If the cyst is small, the size of a pea or a bean, a negative aluminum needle is inserted into its center, and a current of about 5 milliamperes is used and continued for one or two minutes, after which the strength is slowly reduced to zero, and the needle withdrawn. No surgical dressings are required. In a few days the whole tumor will have shrunk up, and as the cyst wall has been destroyed it will not recur. For larger cysts a few drops of saline solution are injected into the center of the tumor, and both positive and negative needles are then inserted into the center of the cyst by separate openings, but fairly close together. The needles are made of copper, and must be inserted parallel with but not touching each other. A current of 2 to 5 milliamperes is then turned on for from three to five minutes, according to the size of the tumor. In the course of four days to a week the opening by which the negative needle was inserted will have enlarged and joined that of the positive, and if sufficient current has been given it will be found easy to enucleate through this opening the whole of the contents of the cyst, together with the cyst wall or the contents may have escaped as a congealed necrotic mass. The loose skin soon contracts, leaving no evidence of the tumor. Tumors formed by *moluscum contagiosum* are cured by the same process. To render the operation painless a 2 per cent. solution of novocaine can be injected hypodermically. Ganglions are cured by the same means.

Dilated capillaries, known as telangiectasis are contracted and obliterated by the insertion of the negative needle for a few seconds. Freckles and other pigmentary spots may also be dealt with efficiently in the same way. Boils and carbuncles are best treated by puncture with a zinc electrolysis needle.

Ionization of zinc salts will cure the various forms of tuberculous skin diseases, especially the non-ulcerated form of lupus vulgaris, old standing cases of tuberculous sinuses may be healed up by the insertion of a zinc electrode covered with lint soaked in a 2 per cent. solution of zinc chloride or sulphate, care being taken that the bottom or end of the sinus is treated before the superficial or external part is dealt with.

Warts are cured by the introduction of magnesium salts, and corns by zinc ions. The latter are much more tedious to remove than the former, as from the nature of the dry callous structure, but perseverance will bring about a cure in time. Chlorine ions will absorb and remove scar tissue, whether the result of burns or surgical operations, etc.

The high-frequency currents are curative for all local pruritic conditions, especially pruritis ani or vulvae. The glass vacuum electrode is applied to the region daily for from ten to twelve applications. They are also useful for the treatment of hemorrhoids, fissure in ano, etc., a pointed glass vacuum electrode being inserted in the anus for this purpose. Pain is quickly relieved and the distended or inflamed veins soon shrivel up. With this method of treatment it is neither necessary nor desirable to put the patient to bed. He can continue his occupation as usual. The treatment is practically painless, so that it is never necessary to give morphia either before or after the operation, nor is any anesthetic required. Local applications of high-frequency vacuum electrode have also proved curative in chronic eczema, seborrhea and seborrheic eczema, alopecia and alopecia areata, acne vulgaris and rosacea, pernio lupus, erythematosis, chronic ulcers, and the condition of the skin known as lichenification.

Marking X-ray Plates. Dr. S. J. Bassford, of Portland, Me., contributes the following:

Some method of marking x-ray plates is necessary for those who take skiagraphs in order that records may be kept, and for cases which are likely to be presented in court, where the x-ray plate or picture may form an important part of evidence.

Some means by which the plate or picture may be identified is very important and necessary.

Various methods are used for such markings.

A very simple and yet very practical method for marking plates is by making whatever record is desired on the envelope which contains the x-ray plate to be exposed by means of an ordinary soft lead pencil.

Any record, date, name, part of body, position of part, and in fact anything desired to be preserved as record, may be written on the envelope over the film side of the plate before exposure. The same will appear on the plate when developed. This method is easy of application and gives desired results.

The Journal of **Advanced Therapeutics**

VOL. XXXI.

AUGUST, 1913.

No. 8

Edited by DR. WILLIAM BENHAM SNOW

Associate Editor DR. ARNOLD SNOW

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SCIENCE VS. EMPIRICISM IN ELECTRO-THERAPEUTICS.

To those who are familiar with the present scientific employment of electro-therapeutics, as used by those who have advanced with the progress of the science, the attitude of investigators who are not informed as to its physiological and curative properties is deplorable.

By a careful retrospect of the progress of electro-therapeutics, with its gradual passing from the empiric to the rational, it can be readily understood why so much scepticism exists in the minds of those who twenty or twenty-five years since gave study to the methods then in vogue, and then abandoned its use or further study; for it is during this later period that improved apparatus and research have placed the science upon an enduring basis. Too many became discouraged with the employment of an agent so fraught with dangers and uncertainty by the then empiric methods of using electricity in medicine.

Too often, even now, electricity is used empirically. It is employed by many with a view to effecting results without an accurate knowledge of the properties and effects of the various modalities. The ultimate recognition of the value of the various electrical methods in producing certain specific effects upon different physical conditions, and derangements will place electricity in the first rank of curative agents, a place it now holds with those familiar with its properties and the correct methods of employing it.

The three distinct effects of electricity, *mechanical, electrolytic and thermic*, fill different fields of indication. Considering electricity from other than the point of view of actual effects produced leads to a great deal of uncertainty in the minds of the profession. The ardent advocates of one or another modality without reference to the specific effects of each leads to doubt and uncertainty in the minds of those who are beginning to study the subject. The advocacy of the constant current to accomplish all kinds of effects, or of the static, high frequency, or sinusoidal current, in a similar way, regardless of the specific action of each on the tissues, is going back to empiric practice. If thermic effects are sought we do not use the constant current to produce them unless we seek to destroy by extreme heat and electrolysis a local growth, for which we may also employ the thermic effects of the high frequency current. When these currents are used, however, for their effects upon metabolism and local inflammation, they should be employed in a definite way in strict accord with their action and not empirically. It is necessary that the students of this subject should unite to place the effects of the different modalities correctly before the profession in order that the advances made will be in accord with the demonstrations of those who have patiently worked out the solution of the great problems involved. A unity of thought and action in these particulars in accord with a concerted understanding by the leaders of thought and research in these matters is essential.

THE MODERN STATUS OF MEDICAL SCIENCE.

With the advancement of science and a wider dissemination of knowledge among the peoples of the world, there is a growing demand that the things done to relieve human suffering shall be in accord with an accurate knowledge of conditions, normal and abnormal, including the causes of disease and the effects of the measures which are employed to correct or relieve processes which have gone wrong. Briefly stated, the intelligent public is demanding a larger measure of rationalism from the medical profession.

Modern methods of diagnosis have made it possible to understand and recognize more accurately conditions which

we designate disease, and to trace more precisely the causes for departures from normal. With these advanced methods of diagnosis there is a growing demand for methods of treatment which shall act in scientific accord to remove causes and correct impaired conditions in the early stages, and thereby prevent the consequences of neglect.

So many abnormal conditions are traceable to germs and their toxins that there has been a growing tendency to treat conditions arising from these causes by means of antitoxins with injections of antibodies, many of which are employed with a definite knowledge of all that portends for danger or relief. Some antitoxins have effected brilliant results, which has created a tendency among enthusiasts to look to them for relief from all conditions arising from infection. The disposition has been to go to extremes with these measures, as has undoubtedly been the case with surgery. Failures and unpleasant results have so often occurred that there is already a manifest reaction among the profession looking to greater discrimination in the preparation and use of these antibodies.

Heroic methods are always fraught with danger, and the success obtained by them are relatively striking, and owing to the extremities under which they are employed the failures are often excused, though a life may have been sacrificed or death hastened. Both wisdom and skill are imperative in the employment of such procedures, for upon the favorable average of results must the standing of the medical profession be rated by the public. The public disposition, as never before, is to underrate medical methods to the detriment of the profession, unless the ways and means are well established in accord with scientific principles which they can understand. Conservatism and a skill acquired by training and experience must be always exercised in the employment of heroic measures.

The present tendency is to a more conservative and cautious employment of surgery, with a growing tendency to save rather than dismember.

Preventive medicine, or the study to remove the causes which lead to or cause disease, has done much for the conservation of life, particularly in the earlier years. There is a necessity for greater attention to the removal and prevention of conditions, which are deranged or leading to derangement, in the early stages before organic disease has intervened in

adult life. To consider the early stages of hypertension or commencing hypertension, a condition ordinarily present, though as a rule unobserved, in the average person before the fortieth year of life, a natural consequence of living and to profess inability to correct the tendency is a professional error, or evidence of want of knowledge of means that will. The ultimate grave condition of arteriosclerosis, which is certain to follow, neglect to control increasing hypertension will lead to the termination of life at an age relative to the condition in each case, together with a probable continuance of the habits which have caused the hypertension. It is not an uncommon thing to find in childhood blood pressure caused by auto-intoxication, which is far above the normal for the age of the child. With a child in such condition the chances of longevity are small and it is doubtful if they reach adult life if the conditions are not corrected.

That high blood pressure in childhood can be corrected by a proper restoration of the functions of important organs, together with a correction of the habits of diet and other conditions found wrong in the individual, is demonstrated beyond question. When such derangements are discovered before serious illness has intervened is the time when they should be corrected, and not after a final collapse occurs. In other words, prophylactic medicine must be supplemented by means which effectively restore functions and correct tendencies to dangerous affections, as drugs will not.

The medical profession has for generations been pampered by a public faith in drug medication, while there has been more or less professional scepticism in their curative action, which has been increased by pathological research. The excuse was want of knowledge of other means. This imposition on public confidence has led to a condition of the public mind bordering on distrust of the profession. This state of mind has been aggravated by the open expressions of Osler and others who have boldly told the truth, and has led to a tendency on the part of the public to seek relief from irregular practitioners and those who employ physical or psychic methods of treatment, because they appeal more strongly to public credence. The intelligent layman is demanding a square deal, and the profession were never more disturbed by the evidences and expressions of want of confidence.

Nothing can be gained by professional criticism or condemnation of methods with which irregulars succeed in selected cases as well, or better than drug medication does. On the contrary, every method that possesses merit should be thoroughly investigated and proper methods adopted.

The tendency of many neurologists to rely upon psychotherapy and to ignore physical agents except as psychic means in the treatment of nervous diseases with an added tendency to neglect to recognize and treat physical causes with physical measure results in failure to cure their patients. A patient in a demented condition which has been caused by a local pelvic inflammation, or auto-intoxication, cannot be cured by suggestive treatment; because it fails to relieve the physical cause. The want of means for correcting a large percentage of physical derangements as employed by the larger portion of the medical profession could be successfully supplied by the modern methods of employing physical measures, which are generally ignored. With the intelligent employment of electricity, heat and cold, radiant energy and other mechanical measures it is generally possible in functional derangements to restore normal functions, thereby removing the tendency to organic disease. It is unfortunate that these measures are not recognized; for there is probably no greater present need for the re-establishment of the medical profession in public confidence than the recognition and adoption of measures which with energy and certainty restore the functions of important organs.

Dr. Dieffenbach, in his presidential address in Denver a short time since, called attention to the modest concession made by a committee of the American Medical Association, commending the teaching of these subjects in the medical schools. He quotes the following from the report of the committee as published in the *Journal of the A. M. A.*:

"The committee is of the opinion that didactic instruction in the general principles, effects and indications of non-pharmacal therapeutic measures, including diet, practical hygiene, massage, exercise, baths, electricity, x-rays, phototherapy, thermotherapy, balneology, climatology and psychotherapy, should for the present be introduced systematically and adequately in the didactic course of general therapeutics, and incidentally in the clinical courses as occasion arises. There

should, however, be a demonstration course, in which small sections of students are taught the actual applications of the physical measures, as also such matters as enemata, position, cupping, venesection, saline infusion, immobilization, counter irritation and similar details in the practical management of the patient.

"This should occupy 10-30 hours, mean, 10 hours, and be placed in the early part of the third year. The department of therapeutics should also secure the co-operation of all the clinical departments, so that the instructors charged with the dispensary and ward work will actively secure to the students under proper supervision the greatest possible opportunities for the practical application of therapeutic measures, pharmacal as well as non-pharmacal."

To further quote this committee. "Non-pharmacal therapeutics is divided into the following departments: (a) hydrotherapy, (b) climatology, (c) dietetics, (d) electro-therapeutics, (x-ray is presumably classed here), (e) psycho-therapeutics, (f) other physical and physiological measures."

Questions suggested by the chairman of above committee:

"These subjects seem to be taught so *unsystematically* at the present time that it seems superfluous to propose specific questions. I hope the sub-committee will prepare a comprehensive report on how these matters should be arranged."

Discussion by Dr. Halsey, of the above committee:

"Non-pharmacal therapeutics should be or best can be taken up after the student has finished his work on drug pharmacology, and after he has begun to acquire some knowledge of pathology, general and special, and also some knowledge of clinical subjects. Such a course should, in the reporter's opinion, come during the first half of the third year."

Dr. Dieffenbach concludes by showing in a most forcible and rational manner the demands for a more liberal consideration of these subjects, with an apportionment of at least four times the period in the curriculum of the medical schools, as that recommended by the committee. He, furthermore, wisely suggests that these subjects be taught with demonstrations in the fourth year instead of the third, as suggested by the committee of the A. M. A.

It is encouraging, as compared with the late attitude of indifference, when men who are shown not to be authorities

and not to have contributed anything on the subjects under consideration, as stated by Dr. Dieffenbach, are willing, as they now seem, to advise a study of these subjects, returning a report such as the above. It indicates a tendency or disposition of the medical teachers at least to recognize the value of physical measures as never before. It could not be expected that such a committee would approach the subject in a way that would commend itself to those who are more familiar with the possibilities of those measures for curing disease. It is, however, a step in the right direction—recognition which points to the possible realization by those who are striving to obtain a section and recognition in the American Medical Association. They should be encouraged and proceed in the efforts already made, and with renewed energy endeavor to obtain the Section, which will thus bring the subjects more clearly before the whole profession.

It is the duty of medical men to abandon prejudice, and investigate all that is good and all that is possible for the relief of disease and by earnest research and endeavor come to definite conclusions which will eliminate the prejudice which exists in the minds of the profession and the community, by the adoption of all that is good and the rejection of measures that have failed to accomplish required results.

THE TWENTY-THIRD ANNUAL MEETING OF THE
AMERICAN ELECTRO-THERAPEUTIC ASSOCIA-
TION, TO BE HELD ON THE 2ND, 3RD
AND 4TH OF SEPTEMBER.

Arrangements are complete for one of the most instructive and enthusiastic sessions in the history of the American Electro-Therapeutic Association, which is assured by the appended program. The Committee on Arrangements has provided for an assembly room and an elaborate exhibit of apparatus in one of the large lecture halls of the Engineers' Societies Building, at 29 East Thirty-ninth Street. The Astor Hotel, Forty-fourth Street and Broadway, will be the headquarters of the Association, and a banquet will be given there on

Wednesday evening, September 3rd, for which all members will be welcome. Rooms can be secured from \$2.50 up.

Programme.

Business Session. 9 A.M.

Scientific Session. 10 A.M. Tuesday Morning.

1. President's Address.
2. Reports of Standing Committees.
3. Electronotherapy. The Physiologic Physics of the Various Forms of Force. Dr. Albert Abrams, San Francisco, Cal.

Tuesday Afternoon Session. 2 P.M.

4. Osteosarcoma of the Inferior Maxilla. A Clinical Report. Dr. F. C. Tice, Roanoke, Va.
5. A Plea for the More Extended Use of the Sinusoidal Current. Dr. Fred H. Morse, Boston, Mass.
6. The Most Common Form of Appendicitis; Its Treatment and Prevention. Dr. S. St. John Wright, Akron, Ohio.
7. Ionic Medication. A Neglected Treatment in America. Dr. F. B. Granger, Boston, Mass.

Tuesday Evening Session. 8 P.M.

8. The Treatment of Torticollis. Dr. Louis Von Cotzhausen, Philadelphia, Pa.
9. A Plea for a Scientific Teaching of Electrotherapeutics. Dr. Wm. Benham Snow, New York, N. Y.
10. Deforming Arthritis and Intestinal Stasis. Dr. A. B. Hirsh, Philadelphia, Pa.

Wednesday Morning Session. 10 A.M.

11. Some Ideas Pertaining to Electro-Therapeutics. Dr. Anthony Bassler, N. Y.
12. The Continuous Current and Some of Its Advantages as a Therapeutic Agent. Dr. F. B. Bishop, Washington, D. C.
13. Physiotherapy of Cancer. Dr. J. A. Riviere, Paris, France.
14. The Treatment of Disease Due to Faulty Metabolism, Such as Obesity, Rheumatism and Diabetes by Exercise Induced by Electricity. Prof. Jean Bergonie, M.D., Bordeaux, France.

Wednesday Afternoon Session. 2 P.M.

15. Food as a Factor in the Causation and Cure of Disease. Dr. J. W. Torbett, Marlin, Texas.
16. Incipient Tuberculosis of Many Varieties Treated by Physical Measures. Dr. Alice B. Condict, Orange, N.J.
17. Good and Bad Lighting. A Simplified Resume. Dr. Percy W. Cobb, Cleveland, Ohio. (By invitation.)
18. A Lantern Demonstration upon the Desiccation Treatment of New Growths. Dr. W. L. Clark, Philadelphia, Pa.
19. The Massive Dose X-ray Method. Dr. George M. MacKee, New York, N. Y. (By invitation.)

Wednesday Evening.

Election of Officers. A short business session followed by a banquet.

Thursday Morning Session. 10 A.M.

20. The Storage Element in the Therapeutics of the Constant Current. Dr. Alfred T. Livingston, Jamestown, N. Y.
21. Electricity as a Tonic. Dr. Julius Weiss, New York, N. Y.
22. The Indications and Contra-Indications of Electrotherapy in Gynecology. Dr. H. F. Pitcher, Haverhill, Mass.
23. Electrical Massage. Dr. C. O. Files, Portland, Me.

Thursday Afternoon. 2 P.M.

24. Static Insulation for Functional Nervous Affections. A Brief Preliminary Note. Dr. A. B. Hirsh, Philadelphia, Pa.
25. Possibilities in the Early Diagnosis of Pulmonary Tuberculosis. Dr. J. D. Gibson, Denver, Colo.
26. Curability of Certain So-called Incurable Chronic Diseases by Modern Methods. Dr. Byron S. Price, New York, N. Y.
27. The Static Breeze in the Treatment of Drug Toxemias. Dr. T. D. Crothers, Hartford, Conn.
28. Combined Physical Forces in the Treatment of Advanced Malignant Disease. Dr. G. Betton Massey, Philadelphia, Pa.
29. Emphysema, and Its Treatment by Modern Physical Therapeutic Means. Dr. Ernest Kingscote, London, England.
30. The Value of a Series Spark-gap on the Static Machine for Roentgen Therapy. Dr. George E. Taylor, Philadelphia, Pa.
31. Title to be given. Dr. S. C. Gamoglou, Cairo, Egypt.
32. Unfinished business.
33. Installation of officers and closing exercises.

A RESUME OF FOUR HUNDRED CASES OF TUBERCULOSIS IN WHICH THE X-RAY HAS PLAYED AN IMPORTANT PART.*

BY J. D. GIBSON, M.D., DENVER, COLORADO.

Many of the cases included in this resume have been previously reported in detail before this Society in reports and papers. I prefer, however, to bring this report up to the present time, discussing the various points in a manner which I trust will not weary your patience with the repetition.

You will remember that I have adopted, or rather used, in the treatment of these three hundred and eighty cases of tuberculosis what I have designated as a method of *intensification of natural elements to the point that they become therapeutic agents*. I read a report before this Association in 1901, at the Buffalo meeting, in which I reported five cases, which were my first cases treated by this method, and I am glad to say that now three of the five cases are still living, and in good condition, and have been at their accustomed employment for years. One of that number died on February 22, 1907, of acute pneumonia on the seventh day of the attack. The day he was taken ill he weighed 185 pounds. There are now records of 380 cases from which we can make observations. I find that of these cases that were treated for as long a period as two months, or long enough for the treatment to favorably affect them, there are now 44 dead from all causes and 10 cases are lost sight of and therefore doubtful. In 380 cases of tuberculosis, treated and watched, throughout the past eleven or twelve years, it must be conceded that the above showing is remarkable, especially so when it is taken into consideration that the great majority of the cases were advanced second and third stage cases. Practically fifteen per cent. died during the twelve years and eighty-five per cent. are still living. These cases were not treated in an institution, where you can control this class of patients who, in spite of you, will do many things they should not. Many lacked money for proper care, and I have seen more than one facing starvation itself; but in spite of all these difficulties eighty-five per cent. are living to-day—a fact which I am pleased to

* Read before the American Electro-Therapeutic Association, Richmond, Va., Sept. 5, 1912.

report, for I believe no other method of treatment of cases like these, many of which were in the second and third stage, can show an equally good record of results.

Many of you are familiar with the method of treatment employed from papers already read by me before the Association. As there may be some present who are not, I will briefly describe my manner of treating pulmonary tuberculosis. As previously stated, the method consists of *the intensification of natural elements to the point of making them therapeutic agents*.

I. The most important agent, probably, is the x-ray, which comprises intense ether vibrations which simulate sunlight, giving us an intensified agency, which has proved to be the greatest foe to tubercular bacilli.

II. Wherever there is great dryness of the atmosphere, as we have it frequently in Colorado, it will be noticed that everything metallic that is touched in walking around your room will give an electric spark to your fingers. It will be noticed that under such conditions patients usually do well, or better than at others. I believe that this condition of static charge to which the patient is constantly subjected is one of the most valuable conditions of a dry climate such as Denver. This effect can be produced as desired by the static machine, thus intensifying this natural element as desired.

III. Ozone, through which is passed an oily antiseptic nebula and inhaled into the lungs, is a personification of an intensified fresh air. Ozone is probably the most vaunted and generally discussed of the agents named, but probably the least useful.

With the x-ray more chemic ether vibrations can be put through the lungs in ten minutes than can be had from ordinary sunshine in months of time. I believe that the irradiations from x-ray sources produce first a hyperæmia of the lung tissues, which can be modified by the volume of the x-rays used in each individual case. This engorgement of the lung thus produced and the continued effect of the chemic light (1) produces inhibition of development and finally death of the germs, which are removed by the leucocytes, and (2) liberates the toxins of the bacilli, thus forcing Nature to furnish amboceptors for their neutralization, thus giving us the purest, most suitable autogenous vaccine conceivable. (3) In addi-

tion, the x-ray penetrates the tubercles, old and young, and exercises its destructive power in these encapsulated foci, where no other agent can possibly reach, as there is usually no blood supply in them.

Together with these agents, I have the climate of Colorado in which to do my work—the place which I selected for myself when suffering with tuberculosis. All things taken into consideration, I consider that Denver has a maximum of natural advantages, to say nothing of its excellent physicians, hospitals, sanitariums and homes, all of which are needed; in fact, are necessities to one suffering from tuberculosis. There probably is no place better supplied with these necessities than the city of Denver.

In addition to the things enumerated, use has been made by me also of drugs, forced feeding, rest or exercise, plenty of fresh air, with all the sunshine possible in the management of these cases.

From the experience gained from these cases, I believe that it would be possible to place in a condition of absolute safety fully ninety per cent. of all cases of tuberculosis, including all complications. I believe the mortality should be almost *nil* in the first and second stage cases, and by patience and perseverance, with careful management, eighty per cent. of third stage cases should be so relieved that they would never die of tuberculosis. Allow me to remind you here that cases with cavities are slow and tedious, requiring much more care and time than the other cases.

As most cases of tuberculosis of the lungs die from complications, I will discuss some of the more serious of these complications as I find them. I have found tubercular complications of the kidney and bladder, serious and difficult to overcome. Not only tubercular conditions of the kidney, but also the more common forms of nephritis are liable to cause a fatal termination. So far I know no definite measures of relief for these cases. Forced feeding from its strain on the heart and kidneys brings danger on the one hand, and light diet and starvation turn the patient over to the ravages of the bacilli. I therefore consider nephritis a very dangerous complication of tuberculosis.

I have seen four cases die from exhaustion and starvation, from the pain on deglutition, from a local ulceration of the

epiglottis and aryteonoids. This probably is the most agonizing complication that can occur in a case of tuberculosis. I have had Dr. L. B. Lockhard, of Denver, amputate the epiglottis in two cases, which relieved temporarily the intense pain, so the patient could eat and drink with pleasure at once, but it was only temporary, as the ulcerations continued to appear, pain returned, and the patients soon died from exhaustion.

In this form of complication I will hereafter insist on having an artificial opening made in the stomach so the patient can be fed through it, in order that their vitality and strength may be retained and the larynx allowed to rest when it can be subjected to local treatments, including the x-ray. I realize that this procedure, without an agent like the x-ray, in which confidence can be placed in its ability to cure the disease in the lungs and larynx, would be useless. My confidence in the x-ray will prevent me from ever again sitting idly by, watching the ravages of the disease until there is a fatal termination.

In tuberculosis of the bowels, especially in the variety known as *tabes mesenterica*, the x-ray is a positive specific. Other x-ray operators in Denver besides myself admit this to be a fact. I have seen tubercular diarrhoeas relieved by the x-ray without having administered even a dose of bismuth. These patients in a few days could eat cabbage and ham without inconvenience, and progress steadily to a favorable termination.

Tubercular fistulae of the rectum, bone, affections, unhealed operative wounds, after operation for empyema, are frequently readily healed by the x-ray, and especially so when the x-ray is used in connection with Beck's paste. This paste can be made radioactive by exposing it for considerable time to the x-ray, after which it should be heated and injected and rayed again. The raying should be kept up until the fistula heals. I call your attention to this procedure of Beck's, especially as I believe it is not being used to the extent that it should be. I consider it in connection with x-ray a great boon in medicine, even in the old unhealed discharging empyemas it is a very *magnum dei bonum*. Allow me to prophesy that in the very near future we will be able to locate the larger cavities in the third stage of pulmonary tuber-

culosis by x-ray stereoptograms so definitely that by long aspirating needles we will be able to introduce that paste or some other radioactive substance to fill up these cavities and cause them to heal, probably in one-tenth the time that it now takes.

Radiography has given us an entirely new light upon the origin or first site of infection in pulmonary tuberculosis. The time-honored right and left apex infection is now shown ordinarily to be secondary to involvement of the bronchial and mediastinal glands. The x-ray has proved beyond question that in at least sixty-five per cent. of cases the infection is primarily located in these glands, and that the infection spreads out over the lungs in a more or less fan-shaped direction, usually extending more rapidly towards the apex. It is probably aided in this direction by the circulation of the blood and lymphatics, and on this account we find the first crepitation in one or the other of the apices. As the x-ray, without question, has demonstrated its great value in the treatment of tubercular cervical adenitis, I contend that there is no reason why it should not act equally as well upon the affected bronchial and mediastinal glands, and therefore in all incipient and suspicious cases of tuberculosis of the lungs the x-ray should be used from the outset in an effort to stop the infection in these glands, and thus abort a subsequent extension of the infection. It is my opinion that you get more prompt results in the glandular cases than you do when the infection starts from the pleura or air passages.

Heretofore I have claimed that the x-ray gave us its greatest results in the second and third stages. What I meant by this was that we see the most marked effects of the treatment in these cases. For instance, there will be greater gains in weight, greater improvement in the cough and greater changes in all the physical conditions. One reason for this is that the incipient case has generally lost no weight and has very little cough. His physical condition is very slightly changed, if at all, from normal; therefore, there is less room for great changes in the physical condition of the patient. Since we now know that the infection, in the vast majority of cases, is a glandular tubercular condition, I consider the x-ray more imperative in the incipient state.

Much investigation has been made of the effects portrayed

by the leucocytes in the progress of cases of tuberculosis in the last three or four years. Webb's theory is that the large mononuclear leucocytes have a special affinity for tubercular bacilli, and have a power of digesting the wax coating of the bacilli with ease, and that they are the only form of leucocytes that do perform this service. He therefore reasons that any specific or agent of any special service in tuberculosis must have the power of increasing this special form of leucocytes. This is certainly an elegant working hypothesis. I sometimes think the x-ray does increase these leucocytes. I am not willing to admit that it does not. The whole leucocytic picture changes so easily and so quickly, and is affected by so many agents and conditions, such as digestion, exercise, sleep, fasting, and the presence of infection, that it is difficult to say anything with definiteness; therefore, it is excellent in theory but not always to be counted on in practice.

After between eleven and twelve years of experience with this method of treating tuberculosis, I believe that it has no rival worthy of comparison. I speak advisedly, as I live and practice medicine in Denver, Colo., probably the greatest resort for tuberculosis in the world, and a city second to none in its number of medical men versed in the management of tuberculosis. This affords me an opportunity to see and know what is being done all around me in the treatment of this disease. I believe that results in second and third stage cases cannot be obtained with tuberculin, vaccines, dioradin or Wright's mercury treatment that will compare at all favorably with the method under consideration. The x-ray and adjuvants get in their most striking results in these very unfavorable cases. It is an agent of power and usefulness, in the advanced and hopeless cases in which you cannot even consider the use of vaccines or tuberculin.

In closing this paper, I want to emphasize the absolute harmlessness, when properly managed, of the x-ray in the treatment of any stage of tuberculosis. I have used it in incipient and suspicious cases, and in every other stage, even at the very gate of death, and I have never regretted one single exposure, nor have I ever seen an untoward effect in a single case out of the many thousands of exposures I have given during the past twelve years.

Discussion.

Dr. G. E. Pfahler, of Philadelphia: I would like to know how often he treats his patients, how much of a dose he gives at each treatment, how he estimates this dose, what the technique is, in what direction his rays are applied, and every other detail regarding the technique that he can give us before the discussion is opened.

Dr. Gibson: That has been brought out in a previous paper. When I first commenced using the x-ray we had no means of measuring these modalities, and I had been treating these cases for years before measurements could be made. I have never found anything yet that answers so well as my observation of the color of the tube in accordance with my experience with the tube. The meter I have been using is made by Meyer in Chicago. It is not a hot wire meter, but a constant current type of meter. I employ between 1 and 2 milliamperes from a Waite & Bartlett induction coil. I employ the ordinary seven-inch tube. I allow a gap of from two to two and a half inches between the end of the regulating wire and the end of the tube. The treatments are given to the back one day and the next it is given from the front. I hardly ever make exposures otherwise directed, unless there is some special cause. The treatments are given every other day with the x-ray. I apply the static brush-discharge ordinarily over the back. Each x-ray treatment ordinarily lasts for ten minutes. In the incipient cases fifteen or twenty minute exposures are sometimes made. The distance of the target of the tube from the patient is as a rule fourteen inches. A point that must be looked for in the treatment is the occurrence of a dermatitis. It is important to maintain a condition near to a dermatitis, but to avoid causing it, because otherwise the temperature will rise with increased depression. I never count on accomplishing much in less than four months—exposures three times a week for four months. I never burn my patient. I do not use any filters. Usually during the last month there is some pigmentation of the skin, but not any to amount to anything. My whole theory is not to destroy tissue, but only to stimulate and build up tissue. I have never measured these doses by any of the accepted radiometers. The milliamperemeter that I have used shows from one to two milliamperes through the tube.

Dr. A. B. Hirsh, of Philadelphia: Considering the amount of time and labor devoted to the subject of measurement of tubes and variation in apparatus given by our fellow member, Dr. Pfahler, I would very much like to have him tell us something as to his opinion in the application of these currents for the purposes described.

Dr. Pfahler: I have no opinion. I only asked these questions for information, because I feel that unless we get some definite facts of this character we cannot hope to even attempt to reproduce Dr. Gibson's results. He has laid greatest stress upon x-ray treatment, but unless we have some idea of his treatment, we may do a great deal of harm or good, depending on the technique. I am quite sure if I attempted to follow the outline he has given us in the treatment of the first week I would burn my patient. I am sure of that. I would no more attempt to employ ten to fifteen milliamperes through a tube at a distance of fifteen inches for ten minutes three times a week on a patient than I would attempt to fly. I am not saying he is wrong, but it shows our difficulty in transforming the technique of one man to that of another. I was hoping if we had the same apparatus that we might be able to reproduce his results. If he had used any of the radiometers that are to-day on the market, while it would not have been exactly accurate, it would have given us some idea. Following out the end results, which is a pigmentation in four months, he must have given about one-twentieth of a full dose at each treatment. I judge that from his results, not from his technique. Therefore, I think if we are going to repeat this treatment we have got to estimate pretty closely on giving about a twentieth of a full dose at each treatment. Do not try to treat your patients with the apparatus that we have in the East with ten to fifteen milliamperes for ten minutes three times a week, or it will bring a great deal of discredit upon Dr. Gibson's method of treatment.

Dr. William Benham Snow, of New York: Perhaps more than anyone here I am familiar with Dr. Gibson's technique and his work. I have seen his work in Denver. The first five cases that he reported were treated in one of the worst climates in the world—Birmingham, Alabama. I know that in the treatment of tuberculosis there he himself contracted tuberculosis, and I well remember the depressed state of mind

he was in when he discovered it and fled to Denver to save his life. I know also that he then at once began the use of the x-ray upon himself while getting ready to go to Denver. In Denver his work has been large and successful. His results are, I believe, the best published by any method. I know of no reports to compare with them. And though I do not often treat cases of tuberculosis, yet in a few cases I have employed the technique he has described, so far as the use of the x-ray is concerned, regulating my own dosage to my own notion of what the patient could stand. The dosage we employ is one milliamperere passing to the tube, with the tube from fourteen to eighteen inches from the patient, given every other day, alternately reversing the chest exposure.

I have never seen anything disappear or any set of symptoms improve under x-ray treatment more markedly than the symptoms of mixed infection. I have known a hectic fever that had been running for weeks at 102 or 104 disappear in one week, indicating that the action upon the pyogenic infection was very remarkable.

I do not wish to take issue with Dr. Gibson on anything. I think, however, that his meter has probably never been right. There is something in his dosage a little more heroic than any of us have seen.

I have used the x-ray in the treatment of tubercular joints, tubercular adenitis, and two cases of tubercular kidney. One case came under my observation during the last year only by telegram. I received a telegram from the husband of a lady physician on the Pacific coast stating that his wife had tuberculosis of the kidney and asking advice. I advised the administration of the x-ray over the kidney for three weeks, followed by the application of the direct d'Arsonval current. A large metallic electrode was placed over the kidneys and a larger electrode of the same material directly opposite over the abdomen. A current was then passed through the patient of as great volume as the skin would tolerate without causing too great discomfort from the heat produced. This patient made a prompt recovery, regaining normal weight and health. I received a letter from her husband early in July, more than a year after treatment was instituted, in which he stated that she had not been so well in years and never had weighed so much as at the time of writing. Radiant light and heat was

also used in this case after the x-ray had been discontinued in connection with the use of the direct d'Arsonval current.

There is one technical point that I would take exception to, that is the difference between the effects of the x-ray and radiant light and heat. It has been fully demonstrated that those two agents are direct opposites: the x-ray goes largely through the body, while the other form of energy is absorbed. The light and heat rays are stimulating, while the x-ray is inhibitory. The x-ray is not an effect of intensified light. We use light and heat after a series of x-ray exposures to relieve a dermatitis when necessary and to improve the nutrition.

It is remarkable how easy it is to manage cases of *tubercular adenitis* which have been rayed one series and then followed with the direct d'Arsonval current and radiant light and heat. A method which I have used more recently is to place an electrode over the gland upon the neck with the patient seated upon the auto-condensation couch and let the capacity of the patient take the dispersion of the current. In that way I have found a more prompt improvement and reduction. Then after the infectious stage is past I have dared to use a wave current, which will flatten the gland, removing the infiltration and deformity.

I congratulate Dr. Gibson on the record he has made. He has reported these methods and results year after year, and his specific measurement of dosage is the only thing that we will have to know perhaps a little better. His own personal technique, where the personal element enters into the work, is an important factor.

I think the effect of the x-ray upon the germs is one of sterilization. He referred to the work of Webb, who has published a method of increasing the lymphocytes in a different way. He puts girdles about the thighs and holds the blood back, as Bier has described. Webb's paper is one of the most instructive papers published on the subject of influencing phagocytosis. This waxy condition of the tubercle bacilli was admirably demonstrated by him. He demonstrated also that the Koch bacilli were only taken up by the large mononuclear cells and not by the polymorphonuclears.

Dr. Arthur W. Yale, of Philadelphia: Nearly five years ago I wrote to Dr. Gibson, and he mailed me a reprint of an article which he had read. Since then I have been using the

x-ray in the treatment of tuberculosis. Last year I read a paper before this Society, in which I gave an outline of the method used. I now use not only the x-ray at a sitting, but a certain effleuve from a tube, and a brush discharge from the tube at the same time I give the x-ray, and also ozone inhalations. I have treated about one-fifth the number of cases that Dr. Gibson has in the last seven years, but most of my cases have been first stage cases. Of the seven deaths, all were in the third stage.

If one will follow out Dr. Gibson's method, I think the change in the tubercular records will be very marked. The x-ray has an inhibitory effect upon the tubercle bacilli, and the patients do improve and gain weight, even without super-feeding. I give my treatments daily, and give twenty to thirty minutes, as a rule, at each treatment. If I am sure from my fluoroscopic examination and my radiogram that the tubercular mass is encapsulated—in other words, if a tubercular nodule is found, I use a very heavy dose the first two or three sittings, without producing a dermatitis, to cause a contraction of the nodule and a squeezing out of the tubercular lymph. In the ordinary case I prefer using a very high tube over a longer period of time.

I wish more of the members of the Society would use the x-ray, and not be afraid of it in tubercular cases. The expectant method of treatment has not given anything like the results that Dr. Gibson has gotten. If we will look at the thing from a scientific standpoint, I think we will all agree that the x-ray offers the greatest hope for the relief of this class of patients, and is one modality we have which we are sure passes through the tubercular mass. We can get no medication, vapor, ozone or anything else in a tubercular mass, because it is shut off from the air and there is no circulation.

Dr. Gibson: I am glad Dr. Pfahler brought out the points he did. These things are so common to me that I did not notice them like a man just beginning who is not so used to them. When I commenced using the x-ray it was a haphazard lick at everything. A great deal of Dr. Pfahler's work is from the skiagraphic standpoint. Skiagraphy is something that you have got to be absolutely accurate in. You can be. But when you come to every day work in your office in treating people you are not nearly so precise.

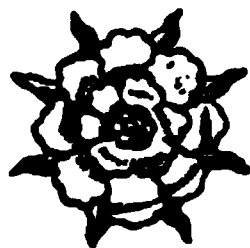
The ray that we use for therapeusis is an entirely different matter from what is used to take a skiagram. You take a ray that will take a picture in one-fifth of a second, or five seconds, and you cannot run that ray ten or fifteen minutes without destroying the tube. One of the chief things is to get a tube that will stand the ray for ten or fifteen minutes with the current we use. The effect on the tube is one of the things that guides us. In one-fifth of a second or two seconds the tube will give the same amperage all the way through, but when you run the same tube ten minutes ten or fifteen times the same day, you won't get the same quality of ray. The ray is not the same thing any two minutes of the ten.

I do not like the Weynelt interrupter for treatment; the Caldwell is much better. I use the Caldwell interrupter for treatment, with a Waite & Bartlett twelve-inch coil. I pass from six to ten amperes through the primary, and I generally judge more by the primary than I do by the milliamperemeter. The ray I use will take from three to four minutes to take a picture through the chest. I consider this ray suitable for treatment, employing about three times the length of exposure to take a skiagraph for a treatment.

Of course, the personal equation naturally comes into the treatment of this condition. In treating tuberculosis you must remember that you are treating a constitutional disease. In treating the lymphatics, which is a localized infection, everybody cures them. In joint cases nearly everybody gets favorable results. But when treating pulmonary tuberculosis we are treating a constitutional disease, and the x-ray, while it is the most important agent, will not cure a tubercular patient by itself. You must know how to treat and manage a case and would probably cure many of them without any x-ray, but when a man uses it and gauges his dose properly he gets results. You do not expect to do much at one treatment. With cancer you expect to destroy tissue; in tuberculosis you expect to build up tissue. In cancer you over stimulate to death; in tuberculosis your idea is to stimulate until you increase the vitality of your tissues, and if you overdo it you do harm instead of good.

Dr. Snow spoke of the light treatment. I have used all kinds of light. I used to use arc lights. You could sunburn your patients and get some good results. But the trouble was

that unless you had a sanitarium where you could put your patient to bed, you would treat the patient and get him so hot he would go out and get ten times worse the next day from cold. But where you can put the patient in bed you can get good results. The x-ray does not heat your patients, but keeps them from taking cold. My patients do not have pleurisy. It is the rarest thing in the world for my patients to have a pneumonia. I do not expect to see a man die when he comes to me any more than you would expect a man to die with malaria. If he will take the time and patience and follow out instructions, I have just as little fear of a man dying as from malarial fever.



INDICATIONS AND CONTRA-INDICATIONS FOR
THE USE OF ELECTRICITY IN DISEASES
OF THE NERVOUS SYSTEM.*

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There is no therapeutic agent known in the treatment of diseases of the nervous system that has enjoyed a greater or more lasting reputation than electricity. *The exact reverse of this statement is, however, equally true.* No agent has been more severely maligned and condemned than electricity in this class of lesions. Whenever there are in existence two such *diametrically opposed views*, it may generally be put down as an axiom that neither is quite correct. The old story of the two knights is rather *apropos*. After some statement that the shield of a certain knight was made of gold, to which the other retorted that it was made of silver, the words grew hot and tempered, with the usual result of a challenge and a duel. After the funeral of the two principals, the seconds, being desirous to know which of the two knights was really in the right, repaired to the owner of the disputed shield, stated their mission and were allowed to make a close and impartial inspection of the shield. Upon examination, it was found that the shield was made of a heavy brass, gold-plated upon the inside and silver-plated upon the outside. The moral is obvious. It behooves us, therefore, to impartially inquire into the statements of either contestant before accepting such contradictory views. In order to do this calmly and impartially, we must first know *what the agent in question really is*, what *its physiological capabilities are*, and whether or not the tissues under certain circumstances are capable of being influenced for good by this agent when properly selected and therapeutically employed.

In the first place, let us investigate the agent itself. *Electricity* is a very large word, especially to-day, in medicine. There are no less than *thirty-five well-known electric modalities*, each one of which possesses some *peculiar physical*, as well as *physiological property*.

At first thought, this might seem strange, yet if we take for an example some one drug like "opium," we find that we

* Read on September 5, 1912, before the twenty-second annual meeting of the American Electro-Therapeutic Association, at Richmond, Va.

possess from *this one drug thirty* or more derivatives. Where the *tincture* of opium is indicated, *morphine*, one of its principal alkaloids, might be *contra-indicated*; where *codein* is indicated, *pulvis opii* may be *contra-indicated*. At least we can see that under certain given conditions we have a right to expect *one derivative* in giving us very much *better service* than another. Should now, perchance, we have fallen into the error of having selected the wrong alkaloid, would it be fair or just to condemn the entire drug? On the other hand, because morphine allays pain, shall we say that opium is indicated in any and all conditions of pain? It would be manifestly more fair to *select the remedy* so as to make it *fit the particular pathology, and should*, under such selection, we meet with failure, we may rest assured that the fault lies not with the agent, but rather with us in not having harmonized the physiological capabilities and responses or the reaction of the living cells that it was our desire to influence.

This picture hardly adequately represents an analogy. The real condition is, in fact, very much more pronounced.

Suppose we were dealing with a patient suffering from spasms, cramps and tetanic convulsions, would anyone think of *strychnin* under such circumstances? *Chloral, morphine* or *chloroform* might be indicated, but certainly *not strychnin*. Another patient in a state of coma, every muscle relaxed, breathing reduced, pulse slow and feeble, would anybody think of *morphine* or *chloroform*? We see from this that it is *not the remedy* that should engage our first attention, but *rather the particular reaction* that we wish to produce in the condition of the patient. Having arrived at the desired reaction, our second thought would be to make use of *that* agent which, under the given circumstances, seems best calculated to produce the desired reaction. At this time, we appreciate the *vagueness* when the text-books or the writer tells us that "*electricity*" is indicated. It might just as well be stated that a "*drug*" is indicated, or, worse, that a "*remedy*" is indicated. The one is assuredly not more ludicrous than the other. The first thing that the physician must therefore appreciate is that the one word "*electricity*" embraces entirely *too much* and, consequently, *means nothing*, for it conveys no *definite* thought.

The oldest electric current known to man is the static.

Some 600 B.C. this current was discovered by Thales. This early philosopher recognized the fact that the static electricity which he succeeded in producing upon amber was the result of expended energy in the form of friction. He also knew that it was a stationary charge accumulated upon the amber, that it had the power of attraction and repulsion, and that the accumulated electricity could be suddenly discharged in the form of a spark.

Benjamin Franklin later on became convinced that the lightning bolt of the clouds and the tiny spark of the amber were one and the same thing. In order to quickly arrive at an understanding of static electricity, let us view the stroke of lightning as an enormous *macroscopic* representation, while the static spark may be viewed as a *microscopic* condition of the same thing. We know that when a person is struck by such a bolt of lightning the effect is immediate death, but when such a discharge strikes a patient in infinitesimally small doses, the effect must be and is correspondingly small. The stroke of lightning has a local and constitutional effect. The local effect is burning and charring, while the constitutional is shock, muscular contraction, with arrest of all the function, and, consequently, death of the individual. The static spark being microscopic in comparison also, has a local as well as a constitutional effect. The local effect upon the living tissue of a static spark is at first a contraction of the local area struck. This is soon followed by relaxation and hyperemia of the local part; if the spark falls upon or near the motor point of the muscle, there is at once a sudden muscular contraction and relaxation. Upon the sensory nervous system it produces a sensation of shock from which there results a greater or lesser amount of constitutional reaction, according to the dose employed. Such enumerated effects are not the result of *accidental* happenings; they are *invariably the same*. This is of considerable importance, for we can figure out with almost mathematical precision the exact reaction that a certain tissue is going to give when a certain kind of current is employed. If, now, the particular reaction obtainable is the one desired or indicated, we know at once how to select the kind of an electric current suitable for the occasion. Neither will any other kind of a *modification* of the same current answer the purpose. The term static electricity embraces a

great many static modalities, as the static wave current, static breeze, static bath, negative and positive static insulation, static induced, etc., etc. Each one is as sharply defined as the static spark, each one causes a specific reaction, and the one cannot be substituted for the other. When one, therefore, is indicated, the other of necessity must be contra-indicated.

The earliest record that we have regarding the constant current was about the year 1750, when Sulzer recorded the fact that when two pieces of dissimilar metal were placed upon the end of the tongue in such a manner that the edge of the two metals came in contact with each other, there was a metallic taste imparted to the tongue.

Later on, Galvani noticed that the muscles of a dead frog would contract when two dissimilar metals were passed through the muscle and contact made.

Volta then produced the voltaic pile, which showed conclusively that the production of the constant current depended upon chemical decomposition between the fluid or electrolyte and the metals or elements used.

At the same time, it became an established fact that, as the galvanic current was the product of chemical decomposition, so that whenever this current was passed through a compound substance, chemical decomposition of that substance must be the inevitable result. Decomposition of compound substances by the galvanic current is known as electrolysis.

We can now formulate the rule that whenever a galvanic current is passed through the tissues, we have going on this decomposition. In the living body more than mere decomposition takes place. Electrolysis may be defined as the decomposition of certain substances by the passage of a dynamic current through them, rearranging the atoms to form new molecules. These newly formed molecules may, under certain circumstances, be desirable; under others, very undesirable.

Even here we must be more specific. We distinguish between the polar and interpolar action. In other words, we may again consider the local or polar effects and the constitutional or interpolar effects.

The positive pole during the electrolytic effect draws to itself all the electronegative ions, such as the acids, chlorine

and oxygen, while the negative pole collects in its vicinity the electropositives, which are the alkalies and hydrogen. The exchange which goes on between the two poles is the general or constitutional effect.

A secondary effect is the irritating or stimulating qualities which this current possesses. In fact, this was the first and principal quality as discovered by Galvani, and has been made use of ever since. This irritating property, especially when made use of at or near the motor points of a muscle, causes a contraction of that muscle to take place, but only during either the opening or closing of the current. The immediate contraction and relaxation being more visible and appreciated by the senses has led many to consider this as the primary and principal effect of the constant current. This error is altogether too common, and the basis for the mistaken use of this current, especially in the diseases of the nervous system.

The galvanic, like the static, possesses many modalities, each one capable of causing certain manifestations and reactions of living cells under a variety of circumstances. Where one modality is indicated, usually the other is positively contra-indicated.

The Faradic current is of more recent origin, and has undergone more widespread changes than all other electric currents together. Induction is the underlying principle of this current, and this is entirely mechanical.

The *induced* current, therefore, when applied to living tissue, acts *mechanically only*, and is, therefore, by itself incapable of causing any chemical changes or alteration of cell structure. By its irritating qualities, it causes muscular contractions similar to the galvanic current. As the induced is made and broken a great many times during each second, these muscular contractions follow each other in such quick succession that they become tetanic and appear as continuous. In reality, the muscle tissue is not allowed time enough to relax before the next stimulating impulse manifests itself, and so remains in a state of contraction during the entire time of the flow of the current.

From this it is apparent that the only office performed by this current is one of muscular contraction. All other results are secondary and due to changes which would take place in tissue, *no matter how or what means were used*, so long as *muscular contraction and relaxation was brought about*.

The induced current, like the preceding, possesses many modalities, each one endowed with a slightly differing effect, yet adhering to the main quality of mechanical muscular contraction. From this Faradic current we have one modality that stands out prominently and alone. This current is of very recent origin and first brought to the attention of electricians in this current by Tesla, who astounded the world by showing that currents of very high potential and frequency could be passed through the living body without any apparent harm.

D'Arsonval and Oudin later showed that this current possessed remarkable properties, differing in many essentials from all other electrical currents. While Tesla had shown that no harm resulted from the passage of this current, it remained for d'Arsonval and Nagelschmidt to show that the passage of the high-frequency current was accompanied with the creation of a large amount of heat. The temperature of the tissues can be raised several degrees in a very short time; yet there is absolutely no sensation of any kind at the points of contact. It is this heat, with the consequent dilatation of the blood vessels and the hyperemia, that we make use of therapeutically. Heat and increased blood supply are the principal manifestations of inflammation, and inflammation is nature's method of recovery and cure.

The high-frequency current, like the other main electric currents, possesses many modalities. All the various modifications depend upon the metabolic changes that this current is capable of producing in the tissues. These changes become all the more interesting when we stop to realize the wonderful fact that we are able to send and almost localize this thermic effect to any tissue or organ, no matter how deeply or superficially located, without directly affecting any other tissue. This high-frequency current and all of its modalities is now passing through the same stages and meeting with the same fate that all the other currents have passed through. This current is lauded to the sky in one quarter and condemned as utterly useless in another.

One of the principal sources of the lack of unanimity is probably due to miscomprehension of terms.

De Keating-Hart, in Paris, and Dr. Bainbridge, of New York, have done a great deal of work with at least one phase

of this current, namely, fulguration in malignant growth. The term fulguration means to flash by lightning, and refers more particularly to the act of flashing, and not to the many other attributes of a stroke of lightning. Yet in fulgurating, after the removal of malignant growths, something more is done than the mere flashing. It is necessary that the patient is well grounded or connected to the earth.

While it is true that a spark of four to eight inches, after having been cooled by a blast of cold air, must strike the parts of the wound, there must never be any charring or other cauterizing effect. It is, as previously stated, a metabolic effect upon the terminal filaments of the sensory, motor and more especially upon the sympathetic nerves, which, as far as can now be judged, are responsible for the softness and smoothness of the resulting scar tissue. At any rate, evidence is accumulating rapidly tending to prove that recurrence of malignancy, after using fulguration, is lower than had been hoped for even by the most ardent supporters of the method. Even at the present time there is much damage being done by the confusion of such terms as fulguration, desiccation, high-frequency sparking, diathermy, high-frequency cauterization, etc. In literature, these terms are commonly used, meaning one and the same thing, yet each modality is well defined and does only a certain kind of work, hence the necessity of discrimination and exactness in all electrical terms.

So far, we have enumerated a few of the electric currents only, as the static, induced, constant and high-frequency modalities. Each one possessed therapeutic qualities differing entirely from the other. *It is this absolute difference in quality and capability that is understood by so few, misunderstood by so many, and underestimated by everybody*, that is responsible for the chaotic condition in which we find the use of electricity in diseases of the nervous system.

Let us pause for a moment and see what some of the leading writers have to say in the use of electrical modalities in diseases of the nervous system. We can do no better than quote from some of the standard text-books:

Osler, Vol. VIII., "Diseases of the Nervous System." This author mentions the use of electricity a great many times, but does not qualify the particular modality. I shall quote as much as possible verbatim, giving the disease, the pathology and the author's way of recommending electricity.

Progressive, spinal, muscular atrophy:

Pathology.—Lesion in the anterior gray horns, resulting in *atrophy* of these cells.

Treatments.—*Electricity*, especially in the form of constant current *may be useful*.

Loomis and Thompson say: Electricity is useless for the prevention of the atrophy, but it may be wise to stimulate the muscles with the faradic or galvanic current to contractions, *in order to gratify the patient*.

One author states that electricity is useful, the other that it is useless, and the general practitioner takes his choice and forms his opinion accordingly.

Amytrophic lateral sclerosis.

Pathology.—*Degeneration* of the pyramidal tracts and *cells in the anterior horn*; essentially death of the motor system and muscles.

Treatment.—Electricity is of *doubtful* value; when the course is slow or has been arrested *it may be of great value*. (Osler.)

Mayer says: Apply galvanic currents to the medulla and spinal cord. In those cases in which there is trouble in swallowing, apply one electrode of the constant current to the nucha, and apply a labile current by means of the other to the region of the neck.

Again, one author condemns, the other recommends.

Syringomyelia.

Pathology.—Spinal cavitation.

Treatment.—In the early stages, electricity may temporarily increase the power of the enfeebled muscles. (Osler.)

Mayer says: Galvanism may be tried, or a mild faradism of the atrophied muscles.

All forms of electrical treatments are probably useless. (*Loomis and Thompson*.)

Myelitis.

Pathology.—Swelling of the myelin sheaths and of the axis cylinder, with finally their disappearance.

Treatment.—Atrophied muscles should receive electrical treatment, provided that this can cause muscular contraction; the kind of current must be chosen accordingly. (Osler.)

Electricity may be beneficial . . . when the rigidity is very marked the galvanic current is preferable to the faradic. (*Loomis and Thompson*.)

Electricity should be used only in the last stage or in convalescence, when it will produce good results. (*Mayer.*)

Landrys paralysis.

Pathology.—Not as yet definitely known.

Treatment.—When the disease has taken on a *definitely favorable* course, electricity may then tend to hasten the recovery of power. (*Osler.*)

Any manipulation of the muscles by electricity *should be avoided.* (*Loomis and Thompson.*)

A revulsive treatment, as the cautery upon the spinal column, has been especially praised. (*Mayer.*)

Here we have a lamentable spectacle—three authors, neither of whom knows the pathology of the disease, one recommends muscular contractions by electric currents, the other condemns, the third uses electro-cautery along the spine, each without rhyme or reason.

Acute poliomyelitis.

Pathology.—Congestion of the spinal blood vessels, proliferation and retrograde changes in the gray matter of the cord, cells and fibers.

Electrical treatment may be employed, although not as important as other measures. The galvanic current must be employed to cause contractions, the *cathode* being used as the *mobile* electrode. (*Osler.*)

Electricity is a valuable agent in the treatment of infantile paralysis. Electricity has no influence upon the course of the disease. Applications of galvanism to the muscles may be of distinct service first, by causing contractions, and, secondly, by promoting the chemical changes in the muscles which are essential to growth and nutrition. (*Loomis and Thompson.*)

Use galvanic current, the *cathode* upon an *indifferent place* or upon the diseased part of the cord, and with the *positive pole stimulate the diseased muscles.* The muscles which react to the faradic current may be stimulated with it. (*Mayer.*)

Again three authors recommending electric modalities: *Osler* says, Use the *cathode* as the *active pole*, while *Mayer* says, With the *positive stimulate the diseased muscle.*

Apoplexy.

Hemorrhage, thrombosis, or embolism of the cerebral blood vessels, causing by pressure in the motor area paralysis of the muscles of the extremities, a hemiplegia.

Treatment.—Pain in the joints from weakened muscles may be quickly relieved by the passage of the constant current through them. (Osler.)

The constant galvanic current has been suggested . . . all that we can say is that *it is not contra-indicated*, but that it yields little appreciable benefit. (Loomis and Thompson.)

Electrical treatment not mentioned. (Mayer.)

Neuralgia (tic douloureux).

Pathology.—Indefinite, usually some vaso-motor changes.

Treatment.—Electricity not mentioned. (Osler.)

The galvanic current is *particularly efficacious*, especially the stable anodal treatment . . . the faradic current can be used for counterirritation. In several cases a cataphoric treatment with cocaine was crowned with success.

If this treatment fails, static electricity can be tried. In true neuralgia I have not seen any success with this treatment. The use of long-continued, but very weak, galvanic currents has been efficacious in some cases. (Mayer.)

Electricity not mentioned. (Loomis and Thompson.)

Of three authors, one highly recommends several modalities, while the other two make no mention at all of any kind of a modality; evidently each one speaking from their own viewpoint, without any scientific deduction having been made.

Without citing any more cases, one must be amazed at the enormous difference of opinion expressed by the various textbooks.

In the same lesion, one author lauds the use of some forms of electric modalities, the next one scarcely deeming it worthy of mention, while the third absolutely condemns any and all electric treatment.

How are we to account for this discrepancy? Simply because electric modalities have been used *empirically* and not *scientifically*.

In every case of disease of the nervous system, there is some underlying cause or reason for the condition; these result in the pathologic changes present.

HOW TO SELECT THE INDICATED MODALITY.

Assuming that the cause has been removed or made inoperative, we consider the pathologic changes. Are these changes located centrally or peripherally? Are the tissues in

a hyperemic or anemic state? Is there increase in the cell structure, or is there a lessening with fat or fibrin formation?

If the pathologic changes are located within the spinal cord and in an anemic state, the high frequency applied between two metal electrodes, one as near to the lesion as possible, with from one to two thousand ma. passing for thirty minutes daily, is the indicated modality, *because it alone* can send heat and cause additional blood supply to the deeper lying parts. If, on the other hand, the cord lesion is in a hyperemic state, this modality is as assuredly contra-indicated. The d'Arsonval auto-condensation, which acts by dilating the capillaries, and so draws the blood current to the surface and frees the center, is the best modality; this should be used daily for thirty to sixty minutes, five hundred to one thousand milliamperes passing. The static breeze or sparks applied all over the body for thirty minutes has the same effect, but not so pleasant to the patient.

If the lesion is located in the peripheral nervous system and of a hyperemic variety, the *anodal* galvanic current applied all over the seat of the lesion, passing from five to twenty-five milliamperes, depending upon the size of the electrodes, is the indicated modality, because of its acid-producing drying and contracting effect upon the tissues. It is plain that, as far as the lesion is concerned, the faradic current is entirely contra-indicated, with the exception of neuralgic conditions. A high-tension rapidly interrupted faradic current is capable of holding in abeyance the transmission of painful sensations. By doing this long enough and often enough, we can duplicate the results obtained by keeping the patient narcotized for one or two weeks, as advocated by Loomis and Thompson, page 538, under neuralgia.

In a peripheral lesion with anemia, the local use of the *negative* galvanic current for its stimulating, alkaline-producing, fluid-attracting and chemical change effected, is indicated.

When the lesion is so situated that it cannot be influenced, that a change cannot be brought about by any of these means, then the lesion itself is beyond reach of *any and all electric* modalities. We may, however, treat the result of the lesion, such as the paralysis of the muscles. This process being en-

tirely of a mechanical nature, only the *induced* current should be made use of for its muscle contracting qualities.

There are, however, conditions in which the muscles will fail to respond to the influence of the induced current; in such cases, the constant must be used, and that particular pole which will cause the contractions to take place is the one indicated. Under such circumstances, the induced current should be tested often, and as soon as possible substituted for the constant. Sometimes static sparks, applied rather vigorously over the paralyzed muscle group by its shock and the local anemia, and later hyperemia-producing effect, causes metabolic change, so that the faradic will cause contractions where it previously failed.

From the foregoing, it must seem clear that in all diseases of the nervous system two important requirements must not be lost sight of: first, a *thorough understanding of the pathology of the disease*; secondly, an *absolute knowledge of the physical as well as physiological effects of all the various electric modalities*. In other words, electricity must emerge from an empiric into an absolutely scientific state.

231 West 96th Street.



REPORT OF A CASE OF RAYNAUD'S DISEASE.

BY DRS. FRATER AND FRATER, SHREVEPORT, LA.

Raynaud's disease, also called symmetric gangrene and local asphyxia, is fortunately rather a rare disease. Its actual cause or causes are not definitely known, wherefore Greene refers to it as "this mysterious, hiemal vaso-motor affection of unknown causation." Apparently there is spastic contraction of the blood vessels supplying the parts involved, and this may be due to some disturbance of the central nervous system. There is local syncope, local asphyxia, and in fully developed cases symmetric gangrene, the parts involved usually being the fingers or toes, or both, and occasionally the ears and tip of the nose. The medical treatment of Raynaud's disease is, for the most part, unsatisfactory, since as a rule in spite of various remedies employed, the disease, where fully developed, usually terminates in gangrene and actual loss of tissue.

The case here reported is believed to be of interest, because under electrical treatment the distressing symptoms were relieved, followed by steady improvement and final recovery, without the appearance of the grave terminal gangrene usual in those cases where there is extreme cyanosis.

The patient was a young man of twenty-four, employed in an office. On December 20, 1911, when he presented himself for treatment, there was nothing in the history elicited, nothing in his appearance, to give any clue to the cause of the trouble. Examinations of the blood and urine revealed no abnormalities; heart and lungs sound; digestion good.

Patient complained of coldness, stiffness, numbness, and constant pain affecting three fingers of each hand. He further stated that on account of pain in the fingers he was unable to sleep at night, except by lying in front of the fire with his hands exposed all night to the heat. This condition had gradually developed during the previous month.

The fingers involved were slightly swollen, and the second and third joints of each—including the nails—were deeply cyanosed and cold to the touch.

A diagnosis of Raynaud's disease was made, and treatment with high potential electric currents begun. The hands and

fingers were thoroughly heated with vacuum tube applications of the Oudin current from Victor No. 7 coil. This treatment was not definitely timed, but was continued until the affected fingers were warm and free from pain, usually about ten minutes being required for each hand. This was followed by placing the patient upon a couch and administering auto-condensation after the d'Arsonval method for ten minutes, a current of 300 ma. being employed for the purpose. This treatment was continued almost daily throughout January and February, and a few treatments were given during March. About sixty-five treatments in all. At first, following each treatment, there was partial, and within a few days entire relief from the pain and discomfort, the duration of the relief gradually increasing until during the third week patient was able to discontinue sleeping by the fire and return to his bed. Gradual improvement was evident until in March, when all symptoms having disappeared patient was discharged as cured. Seen recently, sixteen months later, he stated that there had been no recurrence.

During the course of the disease there developed upon the tip of the left middle finger a small gangrenous area about one-half inch in diameter. This, however, quickly separated, leaving the contour and function of the finger unimpaired.

It is important to note that during the period of treatment the symptoms invariably became worse when, as occasionally occurred, one or two treatments were missed.

In the beginning of the treatment of this case laxatives were indicated and given. Small doses of glonoin were also given at first, and later granules containing strychnine aconitine and digitalin were administered, but there appearing no benefit from these, they were discontinued. There was no other medical treatment.

Eberhart states that the efficacy of the treatment given in this case has been demonstrated in France; but there have been few, if any, reports of cases so treated in this country.

Tousey refers to a report of Bonnefoy, of Paris (1907), in which there is mention of a number of cases of Raynaud's disease treated successfully by high potential currents, the periods of treatment ranging from two to twenty-four months.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

X-ray in the Treatment of Skin Cancer. By E. H. Grubbe, M.D.

The writer reports three hundred and thirty-four cases dismissed from treatment for some time, and extending backward for fourteen years. The cases of epitheliomas were grouped in the paper and classified to every part of the body. The total number treated was 334 cases. The success in these cases at the end of fourteen years comprises a splendid record for the x-ray in the treatment of skin cancer. Of these 334 cases as a whole 80 per cent. are given as successful results. This, when it is taken into consideration that all cases, hopeless and otherwise, that come to a clinic are included, is a remarkable showing. Well may the surgeon be jealous of his laurels in these cases. The writer is not much in favor of surgical intervention, either before or after treatment, and his statistics—80 per cent. recoveries in so many cases—certainly entitles him to an opinion in the matter.

X-ray Treatment of Uterine Fibroids, Menorrhagia and Metrorrhagia. *Med. Record*, July 12, 1913.

Dr. Sam Stern says that the Roentgen ray treatment of uterine fibroids, menorrhagia and metrorrhagia, while still more or less in the experimental stage, has already shown such satisfactory results as to justify its being administered in serious cases of these conditions. Since 1905 thousands of cases have been treated with this agent with very satisfactory results in many cases. In 1911 he began to treat these cases at the request of Drs. Brettauer and Frank at the radiotherapy department of the Mt. Sinai Hospital, and from the cases treated he reports the following results: Altogether 52 cases were treated, 33 of which were treated in the hospital and 19 in private practice. Of these there were 29 cases of uterine fibroid and 23 cases of menorrhagia and metrorrhagia. The cases chosen were of a severe type. Cases that had been under treatment for a number of years, with curettage and other treatment without avail. Some of them were suffering with serious heart lesions, which made operation out of the ques-

tion. The results in the hemorrhage cases were similar to the fibroid cases. The failures were mostly due to submucous fibroids. Dr. Stern believes that radiotherapy has come to stay in the treatment of uterine fibroids, menorrhagia and metrorrhagia, as it is gaining in prestige daily. There were many cases it would cure, some relieve and others were failures. He found that it was usually about four months before the improvement was marked. He states that no case should be abandoned or considered a failure before the fifth month. He believes that cures depend largely upon the technique employed. Most of the failures occurred in submucous fibroids, but occasionally with one of these excellent results would be obtained. The treatment interferes in no way with any other treatment desired, either during or after the x-ray treatment. There was practically no danger in producing a permanent menopause, even in women who were not near the climacteric period. Temporary menopause occurred in young women, but never lasted over eight months, when menses would return in every way normal. The sterility was never permanent. There was absolutely no danger of x-ray dermatitis when the proper technique was employed.

Dr. Brettauer, in discussing the above paper, said he considered the results only temporary, but as such were extremely satisfactory; also, as now differentiation between the constituents of the ray could be made, it was easy to avoid the burns that were formerly so frequent. He wished to sound a warning against the indiscriminate use of the agent. It should never be employed when the adnexia was diseased or when there was the slightest symptoms of malignancy. About the time of the climacteric, with irregular bleeding, a curettage should be done and the scrapings referred to a competent pathologist before the patient was submitted to the rays. One case was operated on which showed a very interesting condition. As a rule ovaries removed with a fibroid uterus show a greatly increased number of follicles in all stages of development, while in this instance only one solitary follicle in the state of development was found. There was no decrease in the number of primordial follicles. Dr. Frank said he thought the author of the paper had taken a very conservative stand, as a German operator had claimed to have treated one thousand cases and had not met with a single failure. Dr. Frank said he and Meyer had examined seven cases of ovaries treated with the x-ray, and they had found the Graffian follicles destroyed; the primordial follicles were least affected. There was a certain effect on the fibroid itself in these cases, as was manifested by the peculiar hyaline fibrous degeneration of the stroma, although the muscle cells seemed little affected. So-called x-ray castration in young people was rather evanescent. The x-ray caused cellular hyperactivity at the start,

and therefore the bleeding might apparently be increased for the first few treatments. In many cases where operation was contraindicated the x-ray proved of great value, especially in bad hearts and kidneys.

The x-ray frequently gave fine results in cases of metrorrhagia and menorrhagia where curettage had failed.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D., LOUISVILLE, KY.

Bathing in Siberia. Good Health, January, 1913.

Lodian, writing in "Modern Sanitation" of the Russian mujik's fondness for the hot bath, described the common procedure thus: "No matter how poor the mujik may be, nor how far located from town or city," says Mr. Lodian, "he will have his hot Russian bath once a week. Saturday is the universal day for this—to be bodily clean for the next day. Supposing, for instance, the mujik is a struggling farmer, with his tree-log house miles away from the nearest depenzia (village), where the communal bath-house is located. Then he rigs up a semi-permanent bath-shed or bath hut in the farm-yard. This will be usually no bigger than an ordinary hen-house, but it serves its purpose fairly well. If he has no caldron or boiler for heating the water, he will secure any old barrel—as a flour barrel, or preserved caviar barrel coming from the Ural region—cut it atwain, and half fill the section to be used with water (or, in winter, snow or ice). In the rude, big fireplace in the bath-hut, a blazing log-fire burns steadily, and among the consuming wood you see big stones about the size of one's head. As the hot water is required, one or two of those stony nobs are jerked by a staff into the tub, which reposes in a hole in the ground just right for receiving the hot cobble-like stones as they are tumbled or shoved into it.

"An apparently not-even-warm stone has, in reality, a vast deal of heat stored in it in that fire, as is proved by the violent hissing and ebullition of the water, and the arising steam fills the hut with hot vapors. Now the mujik is in his glory! Half the shed will be occupied with built-up, step-like platforms, reaching to within a few feet of the roof, so the bather can scale them and repose full-length at the degree of heat which he likes best. There he will lie sprawling lazily, mas-

saging himself leisurely, and anon spanking his body and back with a bit of tree-branch—usually fir. This is in lieu of a brush.

"Plenty of reaction is got by alternating a snow rub with the heat. I have seen Siberians dash out of those piping-hot bath-huts stark naked, with a bucket to scoop up some more snow, to replenish the stone-heated 'water-reservoir' or old tub aforementioned—or, if near a frozen watercourse, to lower the bucket through a hole in the ice, standing all the time barefooted on the ice—then lightly trip back into the simmering bath-shed again. Sometimes, as a cure for rheumatism, the mujiks tumble out of the sizzling bath-place into the deep snow outside, vigorously roll over in it and massage themselves resolutely with handfuls of it for a few moments, then dash back into that heated inferno again.

"The effect of this treatment on tonsilitis is as remarkable as in the case of rheumatism. I have often in mid-winter gone out of a piping-hot bath-house of about 40 degrees centigrade, dressed for returning to the house but without overcoat, and walked about a quarter-mile thereto into temperature of about 40 degrees below zero centigrade. (At 40 degrees minus, centigrade and Fahrenheit are just equal.) That meant a sudden drop of 162 degrees F., yet I never once experienced any ill effect. Although a martyr to tonsilitis in those days—occasionally attacks would aggravate to the point of producing semi-delirium—I was warned never to cover up my throat, but harden it by exposure, and never even to wear high collars, but return to the light and loose cravat of former days. This advice was followed, and for the past decade I have been tonsilitis-free, after a couple of decades of repeated recurrences of the unspeakably distressing evil. This information is given for the benefit of like victims. Remember, that collars cause tonsilitis, and have the moral courage—if you suffer through them—to abandon them. As to 'the opinion of others'—well, which is the more vital—your health or 'the opinions of others?' Have the manhood—or womanhood—to be above 'the opinions of others,' when your health is concerned!"

STATIC ELECTRICITY.

The Treatment of Neuritis. By Dr. William Martin, Atlantic City.

The title of a paper in the March issue of the *Therapeutic Gazette* which in a brief and concise manner covers wonder-

fully well the etiology, pathology, symptoms, diagnosis, prognosis and treatment of neuritis, half the paper being devoted to a consideration of the various methods of treatment. Drug-therapy is dismissed in a few words as unsatisfactory in all but a limited class of cases, and the writer goes with some detail into treatment by manipulation, the static wave current, light, thermal penetration or direct d'Arsonvalization, the use of vacuum tubes, the constant current, and ionic medication.

Attention is called to the fact that few cases of neuritis are incurable if the correct etiology is discovered, the site of the original nerve pressure or inflammation located, and the form of treatment administered which is best adapted to the individual case. It is conceded that no one form of treatment will cure all cases, and that where one fails another must be tried, the static wave current, light and thermal-penetration being given first preference. It was perhaps an oversight that static sparks were not mentioned for use in cases of some degree of chronicity.

The paper makes good reading and is full of valuable suggestions.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

Ionic Medication in Herpes Zoster. By Angus Macnab, F.R.C.S., *Lancet*.

The treatment of herpes zoster of the trunk or limbs offers many difficulties, and if unsuccessful is liable to be followed by peripheral neuritis, or neuralgic pains which will endure for many years. This is especially true of aged or debilitated subjects. So that any successful method of treatment will be recorded with satisfaction.

But anyone who has seen a case of herpes zoster ophthalmicus with its terrific trigeminal neuralgia, followed with an intractable iritis, and ulceration of the cornea with the loss of vision, will hail with joy any remedy which offers any hope of relief. (H. F. P.)

Macnab has recently tried the effect of ionic medication, and claims to be greatly pleased with the result. The drug used was sulphate of quinine, applied by means of the positive pole over the whole area affected, for fifteen minutes to half an hour, with a current of 1.1-5 milliamperes per square inch of surface. In general two applications at an interval of a

week were made to the skin area, and the conjunctiva was treated separately for a shorter time with less current. The neuralgic pains and the disturbed sensibility, it is said, cleared up almost at once; the iritis disappeared and the sensation of the cornea and conjunctiva returned. As there is in every case of this nature some destruction of tissue, a complete return to the normal cannot be expected, but so far as such appeared possible, the author says this form of treatment seems to provide a cure for this distressing affection.

From the ophthalmic point of view herpes zoster can be divided into two classes: (a) those in which there is no affection of the cornea and iris, and (b) those in which there is iritis and general affection of the cornea.

When the iris is not affected perfect recovery can be obtained by this treatment. A cure of this disease is also obtained in severer cases, but unfortunately it does not offer any hopes that the pustulation and scarring which are so disfiguring will be remedied. As this destruction of skin appears to be due to the staphylococci, normally present in the skin, infecting the vesicles, it appears possible by preparing a vaccine from the cutaneous staphylococci and injecting it before the stage of pustulation has occurred, to greatly modify if not to obviate, the suppuration and subsequent scarring. The author states that none of his cases, however, had been seen early enough to allow of such an experiment being carried out.



The Journal of **Advanced Therapeutics**

VOL. XXXI.

SEPTEMBER, 1913.

No. 9

Edited by DR. WILLIAM BENHAM SNOW

Associate Editor DR. ARNOLD SNOW

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THE TWENTY-THIRD ANNUAL MEETING OF THE AMERICAN ELECTRO-THERA- PEUTIC ASSOCIATION.

The twenty-third annual meeting of the American Electro-Therapeutic Association, held at the Engineering Societies' Building, 29 West 39th Street, New York City, was marked by an unusually large attendance and interest, and the papers and discussions were characterized by a scientific tone indicating a degree of progress towards the establishment of scientific standards, which ranks the Association with the leading scientific bodies working for the advancement of knowledge.

There is no question but that attendance upon such a meeting helps materially towards the establishment of uniform standards of work with increased efficiency alike of those already well versed in physical therapeutics and of others whose interest in the work has but recently developed.

The session was presided over by Dr. F. Howard Humphris, the retiring president, with a degree of geniality and tact that is not usually equalled by a presiding officer.

A pleasant feature of the session was the dinner at the Hotel Astor, Wednesday evening following the election of officers, on which occasion Dr. Edward C. Titus, as toastmaster, and the speakers of the evening added greatly to the zest and good spirit of the occasion.

An attractive exhibition of physio-therapeutic apparatus by leading manufacturers gave opportunity to study and compare new and standard types. The benefits to be derived from

attendance upon such a meeting are so great as to commend attendance upon them to all who are in quest of knowledge in these particular subjects.

Those of the profession who are not keeping pace with the modern advances in physical therapeutics can ill appreciate the technical consideration of the subject from the modern point of view. To those, however, who are informed, each session is a feast, no part of which can be missed, as the annual attendance from the far West, South and from abroad indicates.

The following officers were elected for the ensuing year: President, Dr. George E. Pfahler, Philadelphia, Pa.; Vice-Presidents: Dr. Albert C. Geyser, New York, Dr. Frank B. Granger, Boston, Mass., Dr. John W. Torbett, Marlin, Texas, Dr. Wm. L. Clark, Philadelphia, Pa., Dr. Frederic C. Tice, Roanoke, Va.; Treasurer, Dr. Emil Heuel, New York; Secretary, Dr. J. Willard Travell, New York; Registrar, Dr. Frederick M. Law, New York; Board of Trustees (three years): Dr. Charles Rea Dickson, Toronto, Canada; Dr. Edward C. Titus, New York.

The following were elected members at this meeting: Dr. R. H. Pepper, Huntington, W. Va.; Dr. J. W. Croft, Waynesboro, Pa.; Dr. S. M. Damaglou, Cairo, Egypt; Dr. H. A. Bishop, Washington, D. C.; Dr. J. Baldwin, Brooklyn, N. Y.; Dr. W. W. Wilkinson, Phoenix, Ariz.; Dr. W. B. Orbin, Pittsburgh, Pa.; Dr. C. L. Banks, Bridgeport, Conn.; Dr. V. C. Kinney, Wellsville, N. Y.; Dr. G. W. Pfromm, Philadelphia, Pa.; Dr. G. E. Deering, Worcester, Mass.; Dr. F. J. Stansfield, Ben Rhyding, Yorkshire, Eng.; Dr. Wesley Wallace, Brooklyn, N. Y.; Dr. W. S. Garnsey, Gloversville, N. Y.; Dr. A. M. Clapp, Springfield, Mass.; Dr. C. H. Church, Newark, N. J.; Dr. J. B. Bartram, Louisville, Ky.; Dr. C. S. Best, Middleburg, N. Y.; Dr. DeLancy Carter, New York, N. Y.

ROENTGEN RAY DIAGNOSIS OF INTERNAL CONDITIONS.

The improvements made during recent years in Roentgen ray apparatus and technique has opened up an extensive field of opportunity for investigating internal conditions. It has, in fact, developed such a degree of importance that the pro-

gressive internist must either become familiar with the employment of the important appliances himself, or be constantly employing a Roentgenologist who is. The former seems the most likely proposition. In other words, the internist should be equipped with the most modern types of Roentgen ray apparatus, affording sufficient energy for penetration to be able to study the relative positions and conditions of the internal viscera in his own offices.

The technique, employing modern Roentgen ray apparatus, is not so difficult to acquire that it is necessary to employ a Roentgenologist who is devoting his whole time to this department of investigation. On the other hand, the internist, with his familiarity with internal conditions and the relative arrangements under varying conditions of the internal viscera, is better able to differentiate conditions than the Roentgenologist. A knowledge of apparatus of modern types and their adjustment is not so difficult as some Roentgenologists are disposed to lead the student or investigator to believe. It is therefore within the pale of possibility, if not of necessity, for the internist to be prepared and provided to make such careful studies of the positions of the viscera, conditions of displacement, congestion, foreign bodies, calculi, malignant processes, and other abnormalities in his own consulting room. In order to make such scientific study of his cases, he should provide himself with a modern high potential transformer, provided with time switches and having sufficient energy that the rays produced will penetrate the most dense cavities with comparative readiness to give a clear image and make instant impressions on the sensitized plate.

The development of the skiagram probably requires as much skill as making the exposure, but the technique is readily acquired. A properly adjusted illuminating box and devices for making stereoscopic observations provide means of studying these conditions with care and precision. The use of the fluoroscopic diaphragm with means of protection to the operator also makes it possible to watch the processes of peristalsis following the bismuth meal. The apparatus for making these studies is unquestionably expensive, but its value to the internist makes it a matter hardly to be considered, except with the younger physician or man of limited means who is placed at a disadvantage. For these, the laboratory of the

Roentgenologist and the great clinics make it possible for them to study their cases scientifically. The general progress of medicine points more and more to expensive apparatus for practical diagnosis and treatment of a large variety of cases.

The apparatus that is used for radiography ought to be of a type and character that would permit the internist to employ the high frequency currents for the treatment of hypertension, and for the use of thermal penetration in the treatment of internal diseases. These two methods are of so much importance in the therapeutics of internal diseases that the internist, though he may not be aware of it, will find eventually that their value is important in these conditions.

CONDITIONS VERSUS DISEASES.

A study of the textbooks which classify "disease" with reference to the regions of the body with an indefinite consideration of the symptoms complex leads often to confusion in matters of therapeutics. If the textbooks would consider conditions which are similar, occurring, as they do, in different parts of the body, as demanding definite similar lines of treatment, therapeutics would be put on a basis which, considering them as conditions instead of diseases, would avoid much confusion. The consideration of conditions would thus give a clearer idea of the indications for treatment, and medicine would be put on a more scientific footing.

An inflammatory process, which is not infected, but associated with infiltration, is a condition calling for practically the same treatment in whatever part of the body it is found. Infectious conditions, everywhere, should be met with practically the same modalities, viz., the destruction of the germs by the normal body processes, and by increasing local and general phagocytosis, with the coincident impairment or destruction of the germs. So also of numerous other affections which are dignified by the name of diseases. There are few cases which call for the attention of the practitioner that do not present a symptom complex which constitute numerous conditions any of which would be impossible to designate a disease, though an individual cause might exist which produced a condition of altered metabolism leading to the symptoms presenting, but varying in different individuals.

PRESIDENTIAL ADDRESS DELIVERED BEFORE
THE TWENTY-THIRD ANNUAL MEETING
OF THE AMERICAN ELECTRO-
THERAPEUTIC ASSOCIATION

BY

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"Beggar that I am, I am even poor in thanks," and though fitting phrases whereby to express my feelings fail me, I would ask you to read between the lines of this address, and to believe me when I say that all my searchings have failed to find adequate expression of my deep appreciation of the unique honor you have done me by electing me President of this the oldest, as well as the largest, electro-therapeutic association in the world—unique because, to the best of my knowledge, this is the first occasion on which it has conferred upon a European, practising and resident in Europe, the distinction of occupying its presidential chair.

It is prerogative of a President to diverge a little from the main river of science when he delivers his presidential address. He may, as it were, wander into the quiet backwaters and tributary streams, which are perforce passed unheeded by those engaged in the strenuous race for knowledge, but which nevertheless form an integral part of the river as a whole. I will invite you to linger with me in one of these quiet backwaters and, while the eddy and swirl of the great river ruffles the surface—showing that we are still part of the great water system—let us lie under the trees and ponder for a moment on side issues. I want to direct your thoughts to our present position as Electro-Therapeutists in relation,

- 1.—To ourselves.
- 2.—To our professional colleagues.
- 3.—To the public at large.

I fear that it cannot be denied but that, as yet, we are like St. John the Baptist—"the voice of one crying in the wilderness"—and that wilderness is the Sahara of ignorance concerning the efficacy of properly selected and efficiently applied electric modalities for the relief of human suffering. Were I

President, not merely of this society, but of a Utopian state, I would legislate that none but those who had proved their capability in these three relations should be permitted to treat the ills of mankind. But we must begin with a world as it is—not with a world as we would wish it to be: that must be our goal, not our starting point. Efficient legislation for the suppression of quacks—and by quacks I mean persons who claim knowledge which they have not—is impossible till people have evolved beyond those Athenians of old who “ever desire some new thing.” No, we as a scientific body must let quacks alone, and rather, by our example and our precept, secure to ourselves such a meed of recognition from our colleagues and the public that electro-therapeutic quackery, like Lewis Carroll’s snark, will “softly and silently vanish away”—dead of inanition.

And firstly Our Relation to Ourselves.

How can we cast out the mote from our brother’s eye seeing not the beam that it is in our own? Our duty towards ourselves is to read studiously all we can find on our subject in the literature of our own and of foreign countries, always thoughtfully pondering on what we read and carefully sifting the wheat from the chaff.

“Let us give every man our ear but few our tongue;” therefore, when we—deeming that we have some wondrous idea to communicate—are over-whelmed by the fierce desire for literary publicity, let us pause a moment to assure ourselves that, as far as in our power lies, we ourselves have *tested* this idea and have *proved* its correctness, and then, if so, let us write with a modesty—nay even with a diffidence—which will lead others to try our discoveries, and which will engender a respect for the writer that ill conceived or hastily considered conclusions will never merit.

And this brings me to another point. We must not allow ourselves to forget that our speciality is but a segment in the great chain of scientific discoveries; survivals of the fittest, of that great family of children, who are bred from Failure out of Experiment. Of that segment each link stands for a means of relieving suffering. But it is not enough that the links of our special segment—each constituting a unit of electro-therapy—should be efficacious. If they have not some distinct advantage over existing means of cure—either in being more

certain, occupying less time, or causing less pain—then, fascinating though they be to us, they must be relegated ruthlessly to the limbo of forgotten things, for our duty to ourselves and to humanity at large is to see that the patient obtain the best that the *whole* chain of medical science can offer, not merely the best link in our segment.

If we do these things we have destroyed the first third of electro-quackery.

And now for Our Relation to Our Colleagues.

Firstly let us never trespass outside the bounds of our speciality. If a case be referred to us by some fellow toiler in the big workshop, let us never, however great the temptation, nor however strong the persuasion, overstep the limits of our own branch. Professional etiquette, in its greatest and noblest sense should be the cement of our brotherhood, and the public's best safeguard. And now a word on the question of medical etiquette, a term which I think a great pity ever to have been invented. The public seems to think it is a subtle code of laws, difficult of comprehension, devised by the medical profession for its own benefit and to work in great measure against the comfort and free will of the patient. Medical etiquette, as far as I have been able to understand it, is just simply following out the rule of doing to others as you would have others do unto you, or to quote Ella Wheeler Wilcox:

So many gods, so many creeds,
So many ways, that wind and wind,
While just the art of being *kind*
Is all the sad world needs.

And if we do this towards the profession at large we shall go a long way to reconcile those of them who are (not without cause, I am afraid) at present antagonistic to us.

But—and this is a big but—while we loyally try to live *according* to this code our colleagues must help us to live *by* it. When we have expended hours, days, months, nay years of study in the effort to wrest from one of the greatest of nature's forces those potentialities that may help us in our battle with disease and pain, when we have drained our exchequer in the gathering around us of that costly armamentarium necessary to use our knowledge and to apply that force, we have a right to expect a brotherly encouragement.

Yet another duty we have. Remember that our horizon is

not the limit of knoweldge, even though to some it may seem to be so. Nature has no limits, and is inexhaustible. If the horizon which we see to-day is a little wider than it was when we were unqualified students, it is still the narrow boundary of our view. It is not, and cannot be, the ultimate boundary of all knowledge, which will never be reached until all things are revealed. Ours is a young science, and "a boy's will is the Wind's will, and the thoughts of youth are long, long thoughts"—and this is the day of youth. We are heirs to all the ages and the light of young new discoveries must be shed on the want of knowledge of the past. That is what I meant when I said just now that by our "*precept*" we must secure recognition. It is our duty to enlighten our professional colleagues in what particular diseases we can help them. Little is taught of electro-therapeutics in the ordinary text books, or in the general wards of our hospitals. The vast majority of the older generation, and all too many even of the younger, are ignorant of when to call in the aid of electro-therapy as such. I say it is our duty by some such means as the wide circulation among the medical men of the English speaking world of that excellent report of the Committee on Standardization of Physical Therapeutic Measures, or a suitable extract therefrom, to show how and when electro-therapy not only may, but should be employed. One often reads in ordinary medical text books under the all too short paragraph devoted to treatment of some given ailment, "Electricity has been used in these cases." What Electricity? How can the quack know, whose knowledge of Anatomy is infinitesimal and whose ignorance of Physiology and Pathology is stupendous and unthinkable in its magnitude. How can he know? It reminds me of a story of a candidate for examination, who had been carefully told by his tutor that he must avoid saying "he did not know," whatever the question was put to him. When the examiner asked him "What is electricity," after much hesitation he eventually stammered out: "I am sorry, Sir, I *did* know, but I have forgotten." The examiner looked upon him with a compassionate smile and said sorrowingly: "Dear, dear me, what a pity. Only two beings ever knew what electricity was; one was the Almighty Providence who created it, and He has not revealed it unto us: and the other is you—and you have forgotten!"

To the individual unversed in electro-therapeutics, one source of current is as good as another and a long way better. He says "Electricity is Electricity," and fails entirely to understand the subtle difference of physiological effects between unidirectional and oscillating, constant and interrupted, pulsating and alternating currents, between the high potential and the low potential and between currents of high and of low frequency, and further how the effects of these varies again according to its method of administration. Such an one probably regards Electro-therapy as little more than a costly form of suggestion treatment. So long as medical men send their patients to quacks is it to be wondered that such doubts assail? In our branch of work there is ~~much~~ that is scientific and much that is purely technical. As an example of this the unqualified man with practice and intelligence takes a skiagram quite as well—to our shame be it said, often I fear better—than we can. But often he lacks the science to read it. And the accurate reading of a skiagram can only be acquired "by prayer and fasting." It is based on the scientific knowledge of the normal, and once upon a time we all knew our normal anatomy; we passed our examination in it, so we must have known, and therefore I hold that at least the interpretation of a skiagram should always be entrusted to a medical radiologist rather than to an unqualified man.

And so as regards Electro-Therapeutics. It is necessary that the prescriber should have practical experience as to which modality or combination of modalities will be best for each given case. True, it is not imperative that the specialist should, with his own hands, apply the electrodes, turn on the current, or start the static machine and stand by all the time the treatment is in progress. Surely purely routine work can be entrusted to a nurse, trained in administering these applications, but the original prescription, the general supervision, and the decision when to alter the treatment according to the progress of the case can only be decided by experience backed by a knowledge of anatomy, physiology, pathology and of the action of the various currents in the various pathological conditions. When we have taught our colleagues how to prescribe and how to supervise, and when we have trained a competent staff of administrators of electro-therapeutic applications we shall perhaps have committed professional *hari-kari*,

but I think that day is so far in the *ewigkeit* as not to come within the range of practical politics. Still it is an ideal to try and attain, and in our effort at attainment we shall at least be working in the direction of doing our duty to our colleagues.

We all know Kipling's lines:

"If you can trust yourself when all men doubt you,
And make allowance for their doubting too."

We must "trust" ourselves, and we must "make allowance" for the doubting of others, and in each case that we prove the error of those doubts we shall have circumvented Heaven and Earth and have made one more proselyte.

And when our colleagues realize all that can be done by electro-therapy—though they themselves do not practice it, they will entrust their suitable cases to us, and then we can feel that we have dealt a death blow to yet another third of electro-quackery.

Finally Our Duty to the Public at Large.

And this can all be summed up in the one great word *Honesty*. Fearless honesty to tell a patient that electricity can do him no good. Honesty in confessing failure in cases where we have tried and know we have failed, rather than in dragging the patient on week after week, and month after month, because, forsooth, as I heard a man say "If I do not someone else will." It is such conduct as this that has given rise to the French witticism "*la haute frequence c'est la haute finance!*" It is our duty to the patient to refrain from persevering in the face of want of success. Beneficial results are obtainable in such a great majority of cases, and are early discernible, and an early confession of failure is not the failure that a long continued unsuccessful treatment becomes. It may seem to work a hardship on a patient at the end of a week to say that electricity is unsuitable for him, but if there is no improvement from the treatment I am sure that it is the honest way. And lastly, Honesty in our fees—a fair day's wage for a fair day's work.

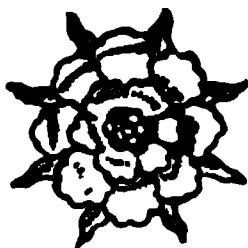
Given the fulfillment of these three conditions we can tune up our vocal cords to sing a hallelujah requiem over the "sheeted dead" of electro-quackery.

Gentlemen, "With thee conversing I forget all time," but I trust I have kept our skiff from drifting so far up our quiet

backwater as to cause sound of the rushing river to be lost to our ears. We all hear its insistent call summoning us to the more serious purport of our presence here. I have tried to while away a few moments of rest for you by outlining what I hold to be our creed—our duty to ourselves and to our neighbors. Like Olive Schreiner's "Hunter," we are all searching for the Silver bird of Truth with the aid of the Goddess Wisdom. We may never attain it here, but for those who search conscientiously upheld by Duty, we all hope to see at the last "slowly from the white sky above through the still air something falling, falling, falling. Softly it will flutter down to us. We shall clutch it with our final grasp to find that at last we have perchance *one* feather from the bird we have given our lives to attain. The effort to reach that goal is unceasing but no matter ; for

"If you can fill each unforgiving minute
With sixty seconds worth of distance run,
Yours is the Earth and everything that's in it,
And—what is more, you'll be a man, my son!"

8 W. Chapel St., Mayfair, London, W.



HIGH FREQUENCY COMMITTEE REPORT.*

FREDERICK DE KRAFT, M.D., CHAIRMAN.

So much mystery seems to be attached in the minds of many to the action of high frequency currents, and more especially to the heat effects attending their passage through the body that it seems not inopportune to inquire into the matter somewhat in detail. It has long been an established fact that every electric current warms the conductor through which it passes. The resistance which the current encounters in its passage through a conducting medium is to a large extent responsible for the conversion of a part of the electrical energy into warmth.

James Prescott Joule was the first to formulate the laws under which electricity is converted into heat (in 1844). Experiments which he conducted resulted in the establishment of the fact:

1. The heat produced is directly proportional to the square of the current strength.
2. The heat produced is directly proportional to the resistance of the conductor.
3. The resulting quantity of heat is directly dependent upon the duration of the passage of the current. Until the improvement in apparatus for the production of high frequency currents, it was impossible to employ currents of sufficient strength in medical practice for utilizing the above fundamental laws.

The continuous current and the alternating currents of low frequency could not be utilized in sufficient quantity on account of their neuro-muscular and electrolytic effects. Currents of sufficient strength to produce thermometric demonstrable heating produced death and extensive destruction of tissue. McDonald and Spitzka found a temperature of 122° Fahrenheit in the spinal canal of an electrocuted criminal.

Not until d'Arsonval and Tesla's experiments gave us those currents which we now call high frequency currents was it possible to employ currents which gave the impression of warmth in the body. This feeling of warmth was known to Tesla and d'Arsonval.

*Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City, Sept. 2d, 3d and 4th, 1913.

Von Zeynek found during the course of experiments which he conducted in the laboratory of Prof. Nernst in 1898 that high frequency currents of a certain definite wave length produced no other sensation than that of heat. He recognized the Joule effect, the warmth, and said: "The d'Arsonval oscillations may prove to be the only method to make it possible to produce an even warming of the body."

Von Zeynek interested von Preyss in 1904 in the pursuit of further studies along this line. In 1905 von Zeynek tested the method clinically at the clinic of Wolfler in Prag on a case of gonorrheal arthritis of the wrist. The chairman of this committee reported to the American Electro-Therapeutic Association in 1906 in a paper entitled "The Methods of Procedure in the Use of High Frequency Currents," a number of cases of gonorrheal arthritis and traumatic synovitis cured by means of what he termed the bipolar d'Arsonval current; also cases of gleet, etc. He also demonstrated this method at the house of Dr. Wm. Benham Snow in the presence of a number of physicians some time previously, and called attention to the warmth. In the winter of 1905 he also experimented with a multiple spark gap, and described this at a meeting in Dr. Snow's house.

Von Zeynek further on found a valuable collaborator in von Bernd. Together they set to work to improve the existing apparatus, with the object in view to obtain continuously oscillating currents.

Waldemar Poulsen was the first to solve this problem. He proved the possibility of obtaining currents of very high frequency and nearly continuous duration by means of an electric arc. These men reported the results of their first series of clinical investigations held at Prof. Ortner's clinic in April, 1908. Ten cases of acute and subacute arthritis were treated with good results.

Nagelschmidt demonstrated the heat effects which high frequency currents display in their passage through the living body in 1907.

Nagelschmidt published a paper in the *Muenchner Medizinische Wochenschrift* in December, 1908, entitled "Tabes und Hochfrequency Behandlung." He calls the method here "Electro-transtermie." Later on Nagelschmidt proposed the name Diathermie as a more suitable one than Thermopene-

tration. This being shorter, in better grammatical taste than the Greek-Latin word and more euphonic. Doyen, Damoglan, Sommerville, and many others in this and European countries had long noticed the warming effect of high frequency currents. Dr. Brinkmann is among the number who employed the warming effect of the current (from a large coil) long before the new names were coined.

Sparkgap. We spoke of a new series multiple sparkgap in our report last year. The sparks in this were discharged unmuffled in the open air. It was found that the silver points were rapidly oxidized, which caused a gradual lengthening of the small gaps. After a time the sparks refused to pass. This necessitated a renewal of the silver plates.

The reason for this was: When a spark strikes the open air N_2O_2 is immediately formed. This thereupon takes on two more particles of oxygen, making N_2O_4 , a very corrosive, oxydizing gas. Some discarded the new sparkgap for the older single gap, where the spark is discharged in a muffler. The objections to the single sparkgap seemed to us to be: When a spark of the length usually deemed necessary according to the older methods (one-half to three inches) is employed, there occurs a very decided ionization of the air in the muffler. This ionized air is an electrolyte. It forms a very good conductor for electricity.

The result is a complete short circuiting of the entire apparatus, a certain amount of backing up of current on the transformer. In a coil this is not so noticeable on account of the magnetic lag in the primary winding, etc.

In a static machine a more or less complete arrest of generating capacity results momentarily. This can be easily verified by those who will watch a machine under these conditions in a darkened room.

With the modern transformer, this backing up of current might easily in the course of time impair its structural balance. It became necessary to devise means whereby the life and efficiency of the component parts of the series multiple sparkgap should be prolonged and possibly improved. After many experiments, the chairman prevailed upon the manufacturer (Wappler) to exclude the air with a view to preventing the further formation of N_2O_4 , and its destructive action.

The sparks in the new series multiple sparkgap occur prac-

tically in a vacuum of peculiar construction. The heat resulting from the passage of the sparks is carried off quickly. As the air in this vacuum expands some of the gas N_2O_4 escapes from inside. Very little fresh air can enter this vacuum from the outside. The result is a minimum of ionized air and a marked improvement in the rapidity of passage of small short sparks. The current thus obtainable possesses the maximum warming effect so far obtainable.

The new sparkgap is so constructed that it can be easily cleaned, and if the time for repairs finally arrives, they can also easily be made.

All delicate instruments require care and adjustment from time to time. All things possessed of extraordinary efficiency will wear. No material thing will last forever. We consider the employment of a multiple sparkgap essential if we wish to obtain a current possessed of oscillations running into the millions.

When we consider the fact that the group of oscillations obtainable from the passage of a single spark has a duration of only $1/50000$ of a second, and the time necessary for the removal of the ionized air in the older type of sparkgap and muffler before a new spark can jump across from the exploders, it will become apparent that the newer method has the advantage. The advantage is particularly noticeable during the employment of the current for strict diathermic methods. Much stress has been laid by foreign writers upon the employment of undamped oscillations in diathermic methods. Strictly speaking, we employ no undamped oscillations, because the resistance encountered converts the current into heat and strongly dampens the oscillations.

Low frequency alternating currents have electrolytic properties. It is possible to produce iontophoresis with sinusoidal currents. Starch suspended in water in which was placed a solenoid which was traversed by sinusoidal currents has been thus decomposed, proteins have been changed into albuminose and peptone. This has only been possible when a certain definite current frequency was obtainable. With currents of very high frequency, no demonstrable electrolytic effect on iodide of potash, and starch has ever been obtained and yet it seems not unlikely that in the complex organism of which the human body is composed the constantly shifting

ions may effect a disturbance in the atomic equilibrium of the molecules which may be of biochemical importance.

The action of general diathermy on animals.

Hirschberg applied the current to rabbits by means of abdominal and dorsal electrodes which were well moistened in water. The elevation of the rectal temperature was rapid.

| | |
|------------------|--------|
| At the beginning | 37 C |
| In 10 m | 37.8 C |
| In 22 m | 38.9 C |
| In 32 m | 38.9 C |

After 32 minutes the rabbit died, probably as the result of overheating of the respiratory center.

The autopsy showed hyperaemia of the skin at the point of contact of the electrodes. Intestines and mesentery were strongly hyperaemic in spots intermingled with bluish red spots.

The left kidney, which received the full amount of the current, was dark red, the blood vessels widely dilated. Numerous small hemorrhages and swollen epithelium were observable microscopically. The heart stopped in diastole, was distended full with fluid blood. The lungs showed nothing abnormal.

A second attempt with another rabbit and stronger current showed a still more marked effect.

Zimmern and Turchini have applied 300-350 m. on the auto-condensation couch on small dogs for 20 minutes and obtained a rise in bodily temperature of 0.3° to 0.4° C.

Schittenhelm has used currents up to 4 amperes on very large dogs, and could so raise the temperature that death resulted. He used large electrodes, also the condenser couch.

When electrodes were used with a current of 2.3 amperes the rectal temperature of the dog rose 4° C (from 39.2 to 43.2). The dog died under general clonic convulsions.

The auto condensation couch had a less effect. The temperature regulating apparatus of the animals was sufficient to remove the additional warmth. The immensely dilated capillaries of the skin allowed the escape of so much heat that no elevation of the temperature occurred during one hour. If the loss of heat is stopped by packing the dog in cotton wadding, then any elevation of the temperature is possible with 2.3 amperes just as in the first instance.

If no covering is used, hence no hindrance to the escape of the heat, a very similar result can be obtained by increasing the current from 2.3 amperes to 4 amperes. The heat regulating apparatus of the animal will now be insufficient and the temperature rises. The pulse becomes more frequent, little at first, but more rapid as the heating exceeds 3° celsius. The blood pressure rises at first, but drops quickly as soon as a certain degree of heating weakens the power of the heart. The respiration becomes deeper and more and more frequent.

Schittenhelm tried the effect of the method (auto-condensation) also on man, notably on himself, and proved that a general rise in temperature could be obtained, that it stimulated the heat regulating functions of the organism most mightily.

In man. The heat passes off by the skin. This is also influenced by the temperature of the surrounding air and the degree of distention of the capillaries of the skin. The temperature of the surface of the body is lower than that of the blood. A peripheral hyperaemia makes possible greater heat losses.

The watery emanation from skin and mucous membranes of the air passages. The increased secretion of sweat enhances the dissipation of watery vapor. The increased rapidity of the respiratory excursions increase the activity possible by the mucous membranes. This automatic regulation of the body enables us to tolerate an addition of heat up to a definite point without changing our temperature. A strictly local application to a joint will not markedly affect the general heat capacity of the body. Large electrodes and larger currents and longer duration of the seance exercise all the powers of defense which we have detailed. Beyond a certain point, a rise of the temperature of the blood is inevitable.

This warming is different from that obtained by any other artificial method. It occurs from within, in the interior of the body, in which every single cell participates. Centers of heat are formed in millions of cells. This heat is only slowly dissipated. The deeper the seat of the cell, the more slowly it loses the stored up heat. An addition of heat beyond the normal stimulates by a reflex effect all those functions which favor the emanation of heat. The capillaries of the skin become widely dilated, much of the blood thus drawn to the surface is withdrawn from the splanchnic circle.

The increase in secretion of sweat varies in different persons. Some will sweat profusely, while others do so only when heavy currents are employed. The frequency of the pulse is usually raised, but varies.

It seems to me that these effects are of very practical importance to us in the clinical employment of high frequency currents, and more particularly in our efforts in effecting the reduction of high blood pressure.

As a result of the heating of the blood and the muscles we exercise the entire heat regulating apparatus of the body. This is probably brought about through a direct stimulation of the sympathetic nervous system.

We spoke of this in detail in our report in 1909.

As a further result of this we cause all of the blood to rush to the surface of the body. Venous congestion, wherever present, is relieved because of the marked activity of the arterial circulation. Anaemia of the splanchnic area ensues. Visceral congestion is relieved. The liver, the intestines and other organs within the abdominal cavity are made to discharge the stagnant pools of blood which bathe their structures.

When the action of the diathermic current has subsided, and the blood stream returns again into its normal channels, freshly oxygenated arterial blood enters in greater abundance into the previously anaemic and (before the heating) venously congested areas. The parts are placed in a better state of nutrition and in a better attitude of defense against the invasion of toxins and bacterial colonies. This is simply on the old principle. To every action follows a corresponding reaction.

As a result of the relief from passive venous congestion of the liver, the activity of this organ is restored. Of all the organs of the body, none has more varied and delicate duties to perform. The final conversion of urates into urea occurs here. Urea is the natural stimulant of the kidneys, hence greater activity in the latter ensues. The same process takes place in the intestines as the result of the fresh arterial blood circulating in its walls. Improved secretion of its natural juices serves as the best antiseptic and as the best barrier to the invasion into the blood of irritating poisons. The relief of the arterial tension which occurs as the result of the quieting influence of high frequency currents is a momentary matter

of brief duration such as occurs after the administration of nitrites and the relaxing influence of a hot bath.

The secondary effect of which we have spoken strikes at the root of the evil. If the arterial changes have not advanced to the point of marked calcareous deposits, impairment in the structure of the vaso vasorum or thinning of the arterial walls, miliary aneurisms, then the employment of diathermic currents of large volume with large electrodes hold out the best prospect of relief. On the other hand, if the reverse be true, they might easily lead to disastrous consequences, such as the precipitation of cerebral hemorrhage.

In the advanced cases of arteriosclerosis, milder applications would tend to improve the general nutrition, keep up the strength of mind and body and prolong the number of days or years of the patient.

In view of the very deep and extensive effects of this current when applied to a large surface of the body, or when the entire body is subjected to its warming influence, it is well to bear in mind the following: The ensuing anaemia in the splanchnic area and the removal of stagnant venous blood from the abdominal organs may throw much detritus and poisonous material into the general circulation. Should the sweat glands fail to respond promptly much additional work would be thrown on to the kidneys. This might lead to grave consequences.

It is advised that the action of the skin be carefully watched.

Frequent examination of the urine is deemed advisable with a view to determine the excretion of urinary solids. Deficient excretion of these would counsel care and moderation in the administration of general diathermy.

Attention is also necessary to be given to sufficient action of the bowels. While it happens not infrequently that profuse watery stools result, a blocking of excretion here would be very undesirable.

These effects are also of very great importance to us in the treatment of intestinal auto-toxemia and gout. That gout, intestinal auto-toxemia and high blood pressure have in some respects a similar source of origin seems to us undoubted. The mode of expression of these is manifold. Their symptoms vary, and their interpretation is at times obscure. We believe, however, that we have in high frequency currents a most potent means for their alleviation and cure.

Discussion.

Dr. William Benham Snow, of New York: One can only discuss this report to commend it. The ground has been so fully covered, and in such a scientific manner, that there is very little, if anything, to be added to it. Dr. de Kraft has given us a classic, not only from the historical point of view, but from the scientific, and the details that he has included, with the precautions that he has given with reference to the administration and uses of currents of great energy.

It undoubtedly makes a difference how we administer the d'Arsonval current in order to influence cardio-vascular conditions. By the application of the direct d'Arsonval current with one electrode over the cardio-vascular centers and the other over the heart, there is danger of producing syncope; and when applied with one electrode over the centers and the other over the epigastrium, more marked effect is produced upon blood pressure than when applied promiscuously. One report has come to me of the application of the current by the d'Arsonval direct method through the chest wall in which one plate was placed over the cardio-vascular centers and the other directly in front on the chest when syncope promptly intervened, and in which there was great difficulty in restoring the patient. That was in a case of asthma. I question very seriously the wisdom of an application of that sort, with any considerable current, over that field. When we wish to produce a hyperemia in that field we should place the electrodes in such position that they will produce the desired effect without involving the cardio-vascular centers and cardia in the path of the current.

The application of this current for the induction of hyperemia is very largely the occasion of its administration. It is far superior for this purpose to any of the methods that have been employed by Bier and his followers, because a degree of heat can be administered which not only influences the superficial but the entire intervening field between the electrodes. I think that in this method we have a means which must be used with reasonable caution, but in which we can depend upon its safety if we use these precautions with reference to the localization of the applications. I do not believe it is possible to produce a dangerous condition in the interior of the body with a heat to the skin that will be borne on the surface. If we were to place a small electrode over an area where there is anesthesia and a large one over a place that is sensitive, however, we would be apt to burn the anesthetic area, but if the electrodes were of the same size this would not occur.

The earliest exposition of the heat producing effect of the direct d'Arsonval was by d'Arsonval himself. The reports of its practical therapeutic uses were first made by Dr. de Kraft in 1906, and two years later by Nagelschmidt. The priority

for practical use in therapeutics belongs to Dr. de Kraft. I do not suppose it makes any difference to Dr. de Kraft, but it is but fair that an American should have the credit.

Dr. G. Betton Massey, of Philadelphia: It may have been my fault, but I could not quite distinguish as to what allusion was made to diathermy or the d'Arsonval current on the one hand, and auto-condensation on the other in this respect. To me it is a little unfortunate to mix the two. Of course, in the report you have to. In a paper you would not have to. We want to make clear in our own minds the difference between the d'Arsonval and the auto-condensation.

Dr. de Kraft: They are both the same. It is a question of the heat.

Dr. Massey: In one case the question is that of local treatment. I merely make a plea for a clearer distinction between these local applications and the general, and the necessary differences in the technique. For instance, in auto-condensation is there any advantage in placing the pole upon the abdomen or holding it in the hand? I am old enough an electro-therapist to be prejudiced against holding it in the hands. The old-fashioned way was to get one of these machines that we now know as sinusoidal, and to hold a little tube in the hand. It does seem to me that we want to know whether that is the correct way in the use of the d'Arsonval, whether it is purely a general distribution of one side of the Leyden jar with the contact made with the hands, or whether the contact would be best made with some other part of the body. Surely the use of the d'Arsonval current as a means of heating up different portions of the body is an entirely different subject, and ought to be kept somewhat distinct. The internal parts are heated up with the old-fashioned flat-iron, and I have used it as the most effective way of treating neuritis of the sciatic nerve. I want to know whether these local applications of the d'Arsonval current will do as good work as that.

Dr. Francis B. Bishop, of Washington: I always feel that if I never heard anything more than Dr. de Kraft's report I should be amply repaid for my visits to the meetings of this Association.

In reference to his spark gap, he certainly has marked a great era of success in the development of the current. There is one thing in my mind that is not exactly clear. I heard Dr. de Kraft speak of using a muffler. I remember that in the earlier spark gaps there was a muffler. Later a spark gap came out on a newer machine with the spark gap absolutely exposed. That instrument I am using to-day with wonderful success with the high frequency, low tension current, and I find very little difficulty. I would like to have Dr. de Kraft elucidate this subject a little in his closing remarks.

Of course, we all have a right to draw our own conclusions as to the physiological properties of currents. I have fol-

lowed Dr. de Kraft very closely, and I am very much inclined to believe that he is right in his conclusions, but I have another idea which I think is well worthy of consideration, and that is that these high frequency currents are largely frictional in their action upon the tissues of the body, and do they not in their action on the tissues produce a normal physiological action of currents in the body, thus producing a chemical action? We know that there are currents in the body coming on with every physiological function, and we know that they may be disturbed, and we know that they are subject to chemical action, and that they must be endowed with all the properties of a continuous current, inducing polar changes, osmotic changes, and electrolytic effects.

Furthermore, there seems to be such a confusion of terms and confusion of ideas in the term high frequency. We have a number of high frequency currents. We have the high frequency low potential current, the high frequency high potential current, the high frequency current applied locally by the vacuum tubes, generally by auto-conduction, auto-condensation, etc. When there is no other designation except high frequency currents it is rather a confusion of terms. I do not mean to accuse Dr. de Kraft of confusion, but I am only speaking of the general use of the term high frequency treatments, that we so often hear without further qualification.

Dr. A. B. Hirsh, of Philadelphia: Each time that I have the pleasure to hear the annual report of Dr. de Kraft the thought comes to me that if only the whole medical profession, so apt to criticise that which is novel, and especially that which is electrically novel, could be here to take in the points he raises and proves in succession, a great deal of the captious criticism of electro-therapy would disappear. It is the want of wide advertisement of the fact that this body is given the benefit of such scientific reports annually that the mistaken impression is extant in the ranks of the whole profession that electro-therapy is largely a matter of guesswork and its influence on patients psychic. The impression must be removed from the medical profession that we endeavor to be anything else than a purely scientific body, and it is the wide dissemination of reports like Dr. de Kraft's that will accomplish this.

There are two questions I would like to put in connection with this report that might be timely. One is, can this modified multiple spark gap be applied to any one of the many varieties of high frequency coil apparatus now offered the profession?

Dr. de Kraft: It can.

Dr. Hirsh: I am glad to hear that. The other question is one that came up in the course of a conversation only recently with the general manager, a high class electrician, of an electrical current supply distribution agency in the eastern part of the country. It is this: Is it possible, in using a rotary

convertor of the direct current into the alternating, for use in some of the types of high frequency coil apparatus on the market, if a fuse blows out and the motor runs down that the frequency rate may reach such a figure as to become dangerous to the patient? I told him frankly I could not answer that question.

Dr. Herbert F. Pitcher, of Haverhill, Mass.: The American Medical Association took enough notice of electricity to state in an editorial that two scientific men had performed experiments, and found that the high frequency current was nothing but heat after all. Of course, it did not go into any explanations, only in a sarcastic way, that after all it was nothing but heat. Acknowledging that to be so, it is a most peculiar kind of heat. It is the most convenient kind of heat that we can use in therapeutics. For instance, if we take a piece of meat or a piece of liver, as you all know, and put it between two metal plates, attaching a wire to each side of the d'Arsonval apparatus, and turn on enough current to penetrate the meat, and if the electrodes are the same size, you will find that exactly in the center of this piece of meat it will become cooked. You take a U-shaped test tube with enough egg albumen and attach a wire to each side of the tube, and after you turn on the current you can begin to see in the center the egg albumen turning opaque. In this way it is the most convenient form of heat we have in therapeutics. With it we can treat the interior of a joint, and every tissue and organ in the body. There is no sleight of hand, nothing wonderful or mysterious about this current which the two scientific (?) men say "*is just heat*," but it will accomplish more and do what no other form of heat will do.

Dr. F. B. Granger, of Boston: It seems to me in treating blood pressure that the idea is being spread somewhat broadcast that the heat production accounts for the fall of the blood pressure. The heat production will account for the fall of the blood pressure, but in so many cases the relative permanency of the result must be due, it seems to me, to another cause, and I have always felt, as Dr. de Kraft has mentioned in his paper, that it must be due to sympathetic nerve stimulation; that in a way we have restored, so to speak, the metabolic equilibrium, and it was a question in my mind, knowing the different wave lengths, whether or not there was a direct sympathetic nerve stimulation analogous to what we have with the stimulation of the retina, with wave lengths of light, and to my mind it was a question whether or not there was a combination of the two, heat effect plus sympathetic nerve stimulation.

Dr. Omar T. Cruikshank, of Carnegie, Pa.: Taking up the remarks of the last speaker, would it not be well to have each manufacturer of electrical apparatus figure out as soon as possible the exact frequency or wave length of the machine

that he puts on the market? There evidently is a difference between the physiological effects at widely different frequencies.

Dr. Edward C. Titus, of New York: I should like to make a suggestion. We must not lose sight of the fact, in considering high frequency currents, that in order to have a pure high frequency oscillatory current we must have a proper balance in the circuit, so as not to have it a pulsatory or uni-directional current. That can only be obtained when the inductance resistance and capacity are in tune. If we will adjust our apparatus according to the thickness of the dielectric, and place an oscilloscope in series, we can determine when we are employing a true form of high frequency current. If those tests are made by purchasers of apparatus, they will have much less difficulty in making a selection. Reports will be more uniform, and the term high frequency currents will be better understood.

Dr. F. Howard Humphris, of London, England: I was reading the other day in the *Journal of the American Medical Association* that these currents were understood by few, misunderstood by many, underestimated by everybody. I think that is perfectly correct. As far as I know, this is the first time that any serious attempt has been made to show why blood pressure is lowered by these powerful d'Arsonval currents. At the recent congress in Berlin last Easter the question came up, and I asked Mr. d'Arsonval himself, and he told me then that he was not quite satisfied as to the way it worked. He thought it was some mechanical arrangement of the cells, some mechanical friction. That same article that I read in the *Journal of the American Medical Association* said that this current, if it had no other reason for being investigated, should certainly be investigated because it is the only method we have at present for producing heat from within out.

I think Dr. Titus' remark about the use of the oscilloscope is very well worthy of attention. I have seen this current given by a good many men, but I have never seen the oscilloscope in working order except for purposes of experimentation. I think it is a valuable suggestion.

Dr. de Kraft: Answering Dr. Bishop's question, he is using a spark gap which is not a series multiple spark gap, but made somewhat after a suggestion of my own. The spark gap is a very good one, and I think has not given any trouble in the past. If Dr. Bishop has found it useful, I think he is justified in continuing its use. But the spark gap I am speaking of is a series multiple spark gap, and by this we have a means of selecting our potential and of using one or more spark gaps at a time, according to the resistance which the current has to encounter in its passage.

In regard to Dr. Hirsh's question, if something should occur at the central station and interfere with the motor gen-

erator, if the current should stop, the current that passes through the Leyden jars is an independent current and would stop, and would remove any possibility of injuring the patient. If it slows down it stops the conversion of the high potential current which charges the Leyden jars in a separate circuit. It is an entirely separate circuit from that which you get from the central power station.

I did not speak so much of the different methods, because it would have made my report too long, but inasmuch as Dr. Massey asked some questions let me explain some few things. There is an important point to consider. If you were to put a metal plate from the vertebral prominence down to about the last dorsal vertebra, and then put another electrode from about the lower sternal region down to the symphysis pubis, what would happen? A very important effect. It would be just about this. You would get a concentration of energy that might be very injurious. It might be that in that case of asthma of which Dr. Snow spoke that is exactly what happened, a concentration of current. Another thing to bear in mind: If you apply a pair of electrodes, one in front and one in the back, over the intestines, and if you were to crowd on the current, it might happen in case an accumulation of gases were formed in the intestines, that those gases might become heated, and as a result of that you might get an internal burn. These things may be remote, but there is a possibility of such a thing happening. In the lungs or any part where there is a large supply of blood we have no such danger, because the blood acts as the carrier of the current and disperses the heat.

I spoke of the effects of high frequency currents in a broad sense. It is true we have the d'Arsonval, the Tesla and the Oudin. They are all high frequency currents. If, on the other hand, we bear in mind the difference in the potential of the two, and if we bear in mind the old laws of the Joule effect, that the higher the potential becomes the lower need be the amperage in order to effect a definite degree of heat effect. So it matters not whether we use a strict d'Arsonval or a Tesla current. Indeed, in some of the European apparatus manufactured to-day they are using the Tesla current. If the degree of oscillations is sufficiently high they can be so attuned as to answer our purpose very well for producing the degree of heat that we desire.

Another thing we must bear in mind is the size of the Leyden jar. By using a very small Leyden jar in employing general diathermic currents we may get a reading of the milliammeter excessively high, running maybe to several thousand milliamperes. This can be so attuned as to read 2,000 milliamperes, yet the patient will not get warm. On the other hand, if the Leyden jar is large and the attunement of the current is of the proper kind, your patient will get excessively hot with a current of only 1,500 milliamperes. So

you see there is much to be learned in the proper attuning of these currents and the adjustment of the apparatus. We will take that up another year in our report.

In speaking of auto-condensation, with the older types of apparatus and the older types of lower high frequency currents it was more necessary than it is to-day to employ a heavy dielectric, because the oscillations were comparatively few in frequency per second as compared with the apparatus which we have to-day. A case in point is what happened to one of our members, Dr. Price. He called me up on the telephone. He had tried to use the bi-polar d'Arsonval current, and the patient jumped. He had tried to use it from a Meyrowitz coil. It burnt the patient, because the frequency was too low and the voltage too great. That was what happened with the old type of coil apparatus. As soon as he used the more modern type his difficulties were surmounted.

Dr. Snow: I would like to have you say that if there is a break in the circuit with any apparatus that will happen.

Dr. de Kraft: Nothing, unless the break happened in the d'Arsonval circuit. Then the patient would receive a severe shock. Another question in regard to the heavy dielectric. If you use a heavy dielectric, or anything that hinders the passage of the current from one side of the Leyden jar to the other, you get a strict capacity effect. It is the capacity effect from the physical standpoint that we utilize in using auto-condensation by the heavy dielectric method. There the patient is charged from one side of the Leyden jar, and the warming occurs in a rather unique manner. The oscillations begin at the surface of the body, and we get eddy currents created in the interior of the body, and those produce the warmth. If we use a certain amount of dielectric we must use also a very large spark gap. Some years ago a certain manufacturer constructed a so-called condenser which was thought unscientific. At that time the current was connected for the upper part of the body and the lower part of the body on a board-like arrangement. As a matter of fact, we cannot draw any spark from a patient lying on such a contrivance, and yet if we were to put an electrode on the tongue and an electrode in the rectum and put a hot wire meter in the circuit and were using a current of 1,500 milliamperes, we could easily collect 150 milliamperes from the patient. There are some things that are not in exact accord with our notions, and for that reason need not necessarily be wrong. We should investigate all things. No matter how we apply high frequency currents we get certain definite effects—that is, heat. We should use our judgment as to how to apply it correctly. If we will bear in mind fundamental principles and use common sense and a certain amount of precaution, we cannot fail to get those effects and get them free from any danger.

On motion the report was accepted and placed on file.

REPORT OF COMMITTEE ON PHOTOTHERAPY.*

HERBERT F. PITCHER, M.D., CHAIRMAN, HAVERHILL, MASS.

There has been nothing new in the way of apparatus reported to your committee for the past year, and there has been very little literature on the therapeutics of phototherapy. Heliotherapy has received some attention in the manner of treating laryngeal tuberculosis. Collet, of Lyons, has successfully treated three cases. He turns the patient towards the sun with his mouth open. The rays are received on a laryngeal mirror, placed in the throat, and reflected into the larynx. The head and eyes are protected by a large hat and dark glasses. The seances are frequently interrupted, and amounted at first to half an hour in the day, later to an hour.

The patient first treated has been completely cured, and has remained so for six years. He suffered from enormous infiltration of the epiglottis, arytenoids and ventricular bands. The dysphagia disappeared in a few days. M. R. Alexandre also used this method, but abandoned it because he found it painful. He now places the patient with his back to the sun, and reflects the rays on the laryngeal mirror from a concave mirror. By means of a plane mirror the patient can insure that the rays are properly reflected into the mirror. There is a central aperture in the concave mirror by which the surgeon can observe that the treatment is being properly carried out.

The seances at first are of five minutes' duration, and are gradually lengthened to half an hour and an hour, with numerous pauses. The good results obtained are said to be remarkable. Iselin reports his experience in the treatment of 202 cases of tuberculous glands. He states at Basle during the past three years surgical treatment in these cases has been almost abandoned. The researches of Grober have shown that the tubercle bacilli may gain entrance by way of the tonsils and retropharyngeal glands, and the author considers that the treatment of glands in which bacilli are lodged is therefore of the greatest importance. So long as the glands

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City Sept. 2d, 3d, and 4th, 1913.

are single and not softened, thorough extirpation is the best method, but when they are matted together or softened the conservation method with light is to be preferred. Direct insulation has proved beneficial in these cases, but is more satisfactorily carried out in such places as the Alpine heights or in hot climates. The sun's rays being too superficial to destroy the glands, he uses the Roentgen rays locally on account of their penetrative action and gives the sun baths to the whole body. He considers the combination of great advantage.

Bering's research has demonstrated that the chemically active light rays have a direct influence on the oxidation ferments, especially on peroxidase in tissues maintained in permanent life *in vitro*. The rays seemed also to promote the cleavage of the chemical building stones of the body cells. This action of light rays on cleavage and oxidation—the main factors in the intermediate metabolism of the cells—explains a certain number of phenomena observed in daily life and in the clinic, as he relates in detail, especially the deposits of pigment and the sensitization of the tissues.

The Action of Red Light in Treatment of Pleural Effusion.—Kuttner and Laqueer induce hyperemia in the depths to promote absorption of effusion by applying the light from an arc or incandescent lamp, passing it through a red glass screen to exclude the chemical rays. Experiments on animals proved the efficacy of the measure, although the effect was much more marked in clinical cases, as the human skin bears the exposure better. They report the details of a few cases from their extensive practice. The red light exposure is from twenty to thirty minutes a day. At the close of the sitting the skin shows considerable hyperemia. The method is applied as an adjuvant to the usual measures for pleurisy with effusion. Freund says that the blue light from burning soda and other monochrome lights may reveal slight changes in the skin that escape detection by other means. The colored lights are not of much use for differentiating cutaneous affections, but with the soda light it is possible to seize the faintest possible briefly transient eruption or efflorescence, and thus permit the correct diagnosis, unattainable in any other way. At the Vienna clinic for syphilis and skin diseases in charge of Finger the mercury or soda light is used to reveal red erup-

tions, while the bluish discolorations are sought for with the red lithium light or the yellow flame. The soda light is obtained by pouring a little soda into a grooved platinum ring fastened in a gas jet or in the flame of a Bunsen burner. Lithium gives a red and thallium a green light, filtering the light through a colored glass also gives interesting findings.

Ultra-Violet Light in the Treatment of Alopecia.—Of the many methods employed to produce the hyperemia necessary for the cure of alopecia, that by the ultra-violet light is one of the most cleanly and convenient. A series of cases have been treated by Dr. L. Delpratt Harris, of the Royal Devon and Exeter Hospital, England, after the manner recommended by Kromeyer. The light was obtained from iron electrodes between which sparks were discharging from an oil condenser attached to a 19-inch coil worked by a 24-volt accumulator batteries giving from 5 to 7 amperes in the primary coil. Half an hour's exposure was generally given, the skin being separated from the quartz compressor by solid ice blocks cut in squares of suitable size, about three-quarters of an inch thick.

A good deal of hyperemia resulted, which lasted for a week. A second administration was not given until this had passed away. Any marked reaction was, of course, allowed to subside before continuing the treatment.

Fluorescence within the tissues is a question which has not been satisfactorily solved, and your committee would respectfully suggest the systematic trial of this method, which apparently is of great value in the treatment of diseases amenable to all forms of light.

Fluorescence is the property which many substances possess of absorbing invisible and visible rays, and giving out in turn visible light. Phosphorescence is the same phenomenon persisting after the exciting agency has been removed. Invisible fluorescence has been discovered, both in the infra-red and the ultra-violet regions. Among the most harmless substances which are fluorescent within the tissues are quinine, isculin, fraxin, easin, fluorescin and its sodium salt, uranine, rhodumin, resorcin, cochineal, etc. The most familiar excitants are sunlight, the various electric arc lights, the Cooper-Hewitt mercury lamp. The disruption discharges of high-tension electric currents, the Roentgen ray and radium. The

most penetrating are the Roentgen ray and radium. One of the most innocent fluorescent substances is fluorescein. A standard solution is employed—one part to thirty of water—and this solution is administered 10 drops three times a day in a glass of water one hour after meals, increasing the doses to 40 drops three times daily. With a minimum dose the patient's urine and saliva, or the serous discharges from an open wound, become fluorescent to ordinary daylight.

The basis of the method is to saturate the patient's blood and tissues with some one of the harmless fluorescent substances and submit the patient to one of the exciting agencies above named. The effect upon the cells would be such an effect as would be produced by different varieties of light, by the chemical and invisible rays of the ultra-violet region, or by the longer wave lengths of the ultra-red region.

The primary effect of these radiations would seem to be to produce an increase of oxygen in intimate relation to tissue molecules.

A secondary and clinical effect of these radiations would be to promote and intensely increase the normal intracellular changes, that is to accelerate the normal cycle activity. It would seem that an intense catabolism is thus established, and the cell, pushed beyond its capacity to keep up with these rapid interchanges, dies or becomes disabled.

Dr. William J. Morton, who has brought forward and used this method for the past ten years, affirms that the success he has met with has been contributed to in a great measure by the fact that the patient has been continuously saturated with a harmless fluorescent solution during the course of treatment. His observation over a number of years has led him to believe the method has greatly enhanced the rapidity of cure in certain cases of cancer lupus, tuberculosis of bones, of the glands and lungs.

The chairman of this committee has used the bisulphate of quinine and fluorescein, and he can affirm that the results were more rapid than in parallel cases without the fluorescent substances.

The suggestion of the committee on phototherapy for the members of the Association to test out this procedure is the only way to prove the value of any method. It entails no amount of expense or risk to the patient, and if as seems

reasonable the fluorescence of the tissues enables the light rays to penetrate depths and intensify the radiations unattainable in any other way, our duty is plain. Why could not fluorescence of the human tissues be as practical and valuable as the intensifying screen in radiography?

Discussion.

Dr. Louis von Cotzhausen, of Philadelphia: I listened with a great deal of interest to Dr. Pitcher's report, but while it was very satisfactory to me and very interesting, I failed to get the information I had hoped I would get on this subject. There are quite a number of particular features about this subject that have never been, in my opinion, investigated fully or decided fully. I have done considerable work in that line myself, and have done it with a certain amount of lack of information, I am sorry to say, as I could not find anything in the literature that would give me the desired data. We are told by some of our eminent men that our so-called 500-candle power 12-ampere lamps will penetrate six inches into the body. If this is correct, then if we use them on the body for an hour or so, front and back, we should get a penetration altogether through that body, as the rays would penetrate six inches from the front and six inches from the back. I know that I have had most admirable results from phototherapy; yes, some which surprised me very much. I have used the 400-candle power lamps, the 500-candle power, and the 50-candle power lamps. The 50-candle power lamp I consider not much more than a plaything, but in the 500-candle power lamp, I think, we are getting an excellent substitute for heliotherapy.

But the question that arises is whether or not we get violet and ultra-violet rays. Some people tell us we do, others we do not. I know that when we use the Finsen ray lamp, if we use a piece of rock, for instance, containing melonite, we get the most beautiful fluorescence. In this lamp the carbons are made of iron, and instead of glass in the lens in front of the lamp is a piece of quartz as transparent as glass. If we interpose a piece of green glass between this rock and our lamp, we cut out all fluorescence and therefore the violet rays. The question now is, whether the white glass in the 500-candle power 12-ampere lamps will do the same. This possible difference never struck me until to-day. I am assured, however, that even a piece of such a white broken lamp bulb, when interposed, prevented fluorescence. If, therefore, all glass cuts out the violet and ultra-violet rays, how then can we get violet rays from such lamps as those we are supplied with, which have a glass bulb?

I merely wish to know whether any new researches have been made in that line. I consider myself fairly well read up in the literature of the day, but fail to find any new reports.

The other question is one of penetration, I wishing to know whether the true penetration of such lamps has been absolutely determined or not.

Dr. F. Howard Humphris, of London: I am afraid I cannot answer. It has been worked out in a report published by Dr. Titus two or three years ago, and since then nothing has been published on the subject.

As to the penetration, nothing has been published on that as far as I know, and I have been watching the literature pretty carefully.

Dr. Cotzhausen: The Standing Committee reported that it penetrated from three to six inches.

Dr. Humphris: Nothing has been done since then.

On motion the report was accepted and placed on file.



*REPORT ON X-RAY APPARATUS.**

BY FREDERICK M. LAW, M.D., NEW YORK.

Regarding apparatus for the excitation of an x-ray bulb, there have been few changes since the last report.

The general trend is to use the transformer with a rectifying switch.

There has been a tendency towards enlarging the machines, thus giving a greater output. The sizes in general use range from 7 to 12 kilowatts.

There are two types of transformers on the market, closed and open cores, each having its supporters. The main object being to deliver a high potential unidirectional current without the use of valve tubes, and one which is capable of a large range of adjustment.

There is one point in installing a transformer which should be given careful consideration. The transmission line to the transformer should be of ample capacity. There is considerable back inductance in a transformer line, and the leading in wires should be larger than the capacity scale the initial amperage calls for. The capacity of many coils is much reduced by having too small leading in wires.

The tungsten target tube seems to have come to stay. The life of the anode is longer and more current can be forced through the tube than with the platinum with less injury to the target.

Some of the manufacturers are placing a ring or a point in the anode with a claim of increased penetration and less heating of the cathode stem in a given time. There is also a tube with a steel shell for the accessory anode with a claim that it forms a reservoir for the gases in the tube, allowing them to enter the shell as the vacuum decreases, thus forming a trap and permitting them to escape into the main body of the tube as the vacuum increases. There is an increased popularity of the water cooled tube for heavy work. It is possible to have a circulating stream of water in contact with the anode, thus keeping the temperature of the tube within safe

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City Sept. 2d, 3d, and 4th, 1913.

limits under heavy milliamperere readings. They are ingeniously constructed, and with care can be used with great advantage.

There is a tube made by an English firm, with an Iridium target, for which much is claimed.

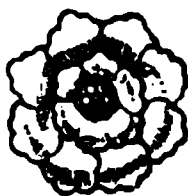
There is a great difference of opinion regarding the reblowing of a tube, but if one is reblown a new cathode must be inserted to preserve the residual gases which are absorbed when the tube is pumped out. Otherwise the tube will be cranky and possess no range of regulation.

I should like to impress upon the members the fact that in order to get a satisfactory tube, it must be constructed to meet the requirements of the operator and pumped especially for the machine it is to be used on. There is a great difference in machines, and the operator must find the degree of vacuum most suitable at a certain adjustment of the power and the tube constructed to meet this adjustment. Then the tube will give the maximum efficiency and possess longer life.

To attempt to enumerate the numerous accessories would make a long paper, but there is one which deserves mention here. This is a lead foil protection for the part not being treated. The foil is fastened to adhesive plaster. A piece the size desired may be cut to fit the part and fastened in place with the adhesive plaster. This is known as Leucoplast.

Various tables and tube stands have been placed on the market, and which can best be described by the circulars from the manufacturers.

On motion the report was accepted and placed on file.



Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

Treatment of Hodgkin's Disease by Means of the X-ray. By L. Herschel Harris, M.D., *Australian Medical Gazette*.

The report is based on observations from thirty cases of Hodgkin's disease treated by the x-ray during the last fourteen years. Arsenic had been tried in every case before presenting themselves for treatment, and all were on a down grade when treatment was commenced. Improvement followed the rays in every case, although several cases relapsed shortly afterwards. All the cases were of a very acute type. The most successful cases were those occupying a single group of glands. In these good results varied in inverse ratio to the number of areas affected.

Probably the most successful result obtained was that of a married woman, who about ten years previous had the glands removed from the side of her neck by an eminent surgeon. They recurred after operation, when he exposed the neck to the x-rays. Some improvement followed, and later she was referred to the author for a continuance of treatment. The glandular enlargement diminished in size and gradually disappeared, and the patient is apparently cured. She was seen recently, and has now been free from any recurrence of trouble for nine years. The glands were examined by a competent authority and declared to be characteristic of Hodgkin's disease. Several other cases pronounced Hodgkin's disease known to the writer had been treated with x-rays, and have remained free from the disease for several years.

In several cases when the disease was generalized, although one or two localized groups disappeared, the general condition of ænemia and asthenia steadily progressed. Again it was noticed that when the mediastinum was involved and consequent dyspnoea followed, irradiating the thorax gave great temporary relief.

Brief description of technique: Rays are filtered through felt paper, leather or aluminum. With Sabouraud's pastile he gives a one-third of an erythema dose, every second day on three occasions, after which rest for two weeks, and then repeat the three doses again. The length of treatment and number varies with the progress of the case.

He states that these cases were not tubercular adenitis, as most of them had been diagnosed by competent authorities as Hodgkin's disease before being sent to him. All of these

cases were saturated with arsenic before coming to him for treatment, and the arsenic was then discontinued.

Conclusions.—1. X-rays in filtered doses, properly administered, are of considerable use in Hodgkin's disease. Most cases are relieved, and some have remained so for several years.

2. In the very acute cases, with marked cachexia and anemia, their use is naturally limited.

3. When employed a thorough and correct dosage must be used, and all the affected areas attacked, including the spleen and liver, if they too be enlarged.

4. The rays should be tried alone, and failing to respond then arsenic may be used at the same time.

TRANSLATIONS.

BY DR. EDEN V. DELPHY.

Spondylosc rhizomelique et obésité traitées par la gymnastique électrique. Lobbe.

A case is reported of a man of 33 years of age who was attacked with articular rheumatism associated with spondylosis. In connection with this there also has developed a marked obesity. A regime was instituted associated with electric gymnastics with the apparatus of Bergonie which reduced the weight from 102 to 86 kilogrammes. At the same time the spondylosis was much improved. The pains were diminished, the mobility of the spine was restored to almost normal, so that the patient returned to his work as a porter.

Magnesium Ionization in a Case of Veruca Plana Juveniles.

Dr. F. L. D. Verteuil. (Abstract from *Archives of Roentgen Ray*.)

The patient, a young man, aged 23, had a large number of these warts on the face, consisting of flat, yellowish papules about the size of a small pea. They were almost entirely situated over the lower region, being particularly numerous on the chin. He had suffered from these for over a year. Under various applications, and even sometimes without any particular treatment, some of them would disappear, but he was continually reinfesting himself by shaving.

When the doctor first saw him he prescribed the local application of glacial acetic acid. This, however, did not prove satisfactory, as no sooner was a papule removed than another appeared in the neighborhood. He next tried the application

of a small radium application of 500,000 activity. This effectively cured the papules over which it was applied, but on account of their number such a treatment would prove too long and tedious. The next method was the use of magnesium ionization. A pad consisting of several superimposed layers of lint impregnated with a solution of magnesium sulphate (20 grains to the ounce) was applied over the warty area; over this he applied a sponge electrode dipped in the same salt solution connected to the positive pole, the negative pole or electrode being placed in the patient's hands. A current of 7 to 8 milliamperes was applied for 20 minutes. In this manner the various areas of the face were treated. He did not see the patient until two or three weeks later, when he was practically cured. The papules had gradually shrivelled up and been detached, leaving an invisible cicatrix. The strength of the current used in no way inconvenienced the patient, there being merely a sensation of slight warmth and tingling.

(The report of this case is further evidence of the value of a method of treatment which the editor of this department has used many times with success.)

CURRENT LITERATURE.

BY A. B. HIRSH, M.D., PHILADELPHIA, PA.

Electrolysis in Treatment of Trigeminal Neuralgia. By A. Rethi. (*Münchener medizinische Wochenschrift*, February 11, 1913. Summarized in the *Journal of the American Medical Association*, March 22.)

Rethi remarks that most of his patients with trigeminal neuralgia had sinusitis, but in a surprisingly large number of cases the neuralgia was traceable to malaria or syphilis; he is astonished that so few seem to think of the possibility of these latter with trigeminal neuralgia. He has often encountered patients with neuralgia rebellious to all other measures that promptly subsided under specific treatment for malaria or syphilis. He has found perineural injection of alcohol very useful, but even this fails at times. In one such case he destroyed the nerve by electrolysis, using for the purpose a needle such as is used for depilation, only that it is longer and is insulated to within 1 cm. of the tip. Half an hour beforehand he injects morphin; then after fifteen minutes he disinfects the field and injects a local anesthetic. Fifteen minutes later he introduces the cathode needle and turns on the current from 0 to 20 or 30 milliamperes. The sitting lasts for fifteen minutes. There was no headache thereafter, and

none of the three patients thus treated has had any return of the neuralgia. The action of electrolysis is more certain than that of alcohol injections, because the nerve is entirely destroyed for a distance of from 1 to 1.5 cm.

The Benefit Through Reduction of Toxicity of Tuberculous Foci from Roentgen Exposures. By H. Iselin. (*Deutsche Medizinische Wochenschrift*, February 13. Summarized in the *Journal of the American Medical Association*, March 22.)

He states that since the beginning of 1907 he has given Roentgen ray exposures to 300 patients with glandular tuberculosis. The rapid reabsorption of the tuberculous glands frightened him at first, but experience soon showed that no injury had resulted except in 6 cases, while the patients gained in weight as a rule. In 81 patients with bone or joint tuberculosis all gained in weight except 14. Fully 77 per cent. of his patients with surgical tuberculosis showed this surprising gain in weight. It demonstrated that the reabsorption of even an entire tuberculous process not only does not injure the body, but actually proves beneficial. The gain in weight further shows that the exposure of the focus seems to exert a favorable influence on the general condition and reinforces the defensive powers. He was not able to keep the records of the temperature, as the subjects were all out patients. This fact renders the gain in weight the more significant than if they had been in a sanitarium or hospital; they simply continued their ordinary mode of life. One girl of 19 was given the Roentgen exposures for a nodular tubercular peritonitis without effusion: in three months she had gained 20 pounds. One workingman with a large process in the ilium gained nearly 18 pounds in six months, all the time at work. One woman of 50 with an open process in both knees gained seven pounds in six weeks after a single exposure of each knee.

Direct Sunlight in the Treatment of Surgical Tuberculosis. By Rollier of Leysin. (*Monatsschrift für Kinderheilkunde* of Berlin, XI, No. 8. Summarized in the *Journal of the American Medical Association*, February 15, 1913.)

Rollier has treated 700 patients with surgical tuberculosis within the past nine years, and is convinced that all forms of surgical tuberculosis at any age can be cured by direct exposure to sunlight. Under no circumstance would he open a tuberculous abscess. He keeps his patients in the open air day and night, practically all the year. They are exposed to

the sun gradually—at first only the feet for five minutes three times a day, then the leg up to the knee, then the buttocks, and, finally, by the seventh day, the back and abdomen. The skin becomes gradually pigmented till it is red or dark brown. This pigmentation seems to be an important factor in the cure. The positive chemotaxic action of the leucocytes on the bacteria is materially increased. He regards the dry cold air of high altitudes as a valuable aid to the sunlight. Moreover, the light loses a great part of its effectiveness in traversing lower layers of air filled with dust, microbes and moisture. Plaster casts are never used in connection with this treatment, as they cut off the sunlight from the affected parts. Immobilization is effected by linen bands or jackets that can be loosened and expose the part to the sun. Joint function is restored in almost every case. Tuberculous glands are softened and absorbed. One of the most marked characteristics of the sunlight is its analgesic effect; pain stops very early in treatment. Numerous pictures are given showing not only the healing of the tuberculous lesions, but a pronounced improvement in the general condition.

SOCIETY MEETINGS.

INTERNATIONAL MEDICAL CONGRESS.*

“The Section of Radiology is a newcomer in the programme of an International Congress of Medicine, but it proved a lusty infant, and as many as 200 members must have been assembled in the Geological Theater of the new School of Mines on Wednesday afternoon, when the session was opened. The French workers in this branch of medicine were particularly in evidence, perhaps the best known among them being Professor J. Bergonié, of the University of Bordeaux. The other side of the Atlantic also was strongly represented. A hearty welcome to all and sundry was extended by the President of the Section, Sir James Mackenzie Davidson, who, in a very brief introductory address, pointed out how vast a field had been opened up to medicine by the discoveries of Roentgen, Becquerel, and the Curies. It might be said of radiologists that they employed the minutest vibrations in the ether of space for the diagnosis and treatment of disease. An instance of the increasing value of the x-rays purely as a method of examination was afforded by the extraordinary precision which was now possible in the localization of foreign

* Held in London from the 6th to the 12th of August Report from the Section on Radiology. *British Medical Journal*, August 9, 1913.

bodies, especially in the eyeball and orbit. The stereoscopic picture in this connection had proved itself of immense service, and although stereoscopy did not enjoy the wide following it deserved, it would ultimately commend itself, he felt sure, in connection with the fluoroscope, even for the examination of the intestine, with the aid of the bismuth meal. An exhaustive paper was read by Dr. James T. Case, who as roentgenologist at the Battle Creek Sanatorium in Michigan has had large opportunities of studying the x-ray intestinal picture. Indeed, one of his American colleagues said of him in the course of the discussion that he was accustomed to sit before the fluorescent screen for eight hours nearly every day, examining bismuth cases. Dr. Case said that during the last thirteen months he had made a Roentgen examination after a bismuth meal in some 1,500 individuals. Dr. Case's paper, and perhaps even more his lantern demonstration, brought out many interesting points in connection with colonic peristalsis and antiperistalsis. In the majority of cases in which he had observed antiperistalsis, the picture was that of successive waves originating in the transverse colon near the hepatic flexure; they had never been seen to proceed clearly to the tip of the caecum, but only to a point corresponding approximately with the ileo-caecal junction. He had seen at one time as many as five antiperistaltic waves between the caecum and the middle of the right half of the transverse colon. Perhaps the most interesting section of the paper was that which concerned the author's observations of incompetence of the ileo-colic valve. He had found this to occur in a certain constant percentage. Out of a series of 200 gastro-intestinal cases, 33 showed this incompetency by the barium clysm. In the light of existing knowledge of the functions of the ileo-colic valve, he thought it reasonable to believe that those cases in which rectal alimentation had proved successful were the cases of ileo-colic valve incompetence. Under ordinary conditions the valve acted as a sufficient barrier, so that any attempts to introduce fluid beyond it, either for diagnosis or treatment, were unsafe and unjustifiable. These conclusions with regard to the ileo-colic valve were supported by Dr. Lewis G. Cole, of New York, who said that during the last four years he had recognized about 60 cases of ileo-colic valve insufficiency. In his reply upon the discussion, Dr. Case added the interesting point that although diarrhoea had been considered the cardinal symptom of ileo-colic valve insufficiency, the x-ray studies, covering about 250 cases, had shown that, instead of diarrhoea, intestinal—and more especially ileal—stasis prevailed. Three papers were read on radio-therapeutic subjects, the first by Dr. Béclère, describing his technique in the treatment of leukaemia, and the other two, by Dr. J. Belot of Paris, and Mr. C. R. C. Lyster of London, detailing their personal ex-

periences in the x-ray treatment of exophthalmic goitre. Dr. Belot considered that it was always to an alteration of the glandular function and of the gland itself that this condition must be attributed, and that the special action of the x-rays on the glandular elements justified the radio-therapeutic procedure. He used an aluminum filter of $1\frac{1}{2}$ mm. in thickness, and obtained his results without producing any lesion of the skin. Out of 30 cases treated only 5 showed no amelioration, but, on the other hand, only 8 showed a diminution of the goitre, and only 6 a diminution of the exophthalmos. Mr. Lyster, in the course of his paper, said that he was unable to state with certainty the sequence in which the symptoms decreased, but, so far as he had been able to observe, the rapidity of the heart's action was lessened, tremor disappeared, and the general excitability of the nervous system became less marked. He had treated a few patients who were suffering from the disease in the acute form, and in these the vomiting and diarrhoea ceased, the heart's action diminished at once, and the condition generally changed from the acute to the milder type. The two papers initiated an interesting discussion, in which there was a good deal of interchange of experience, favorable on the whole to radio-therapy, though it was suggested that the data were as yet inadequate for a definite conclusion, and that such data as were available were sometimes perplexingly inconsistent."

Physical Therapeutics at the Minneapolis Meeting of the American Medical Association. Dr. G. Betton Massey.

The few papers on the physical forces in medicine and surgery admitted to the program were scattered through sections as usual, requiring a most harassing watching of the large program by those interested, who, of course, were compelled to register in sections not representing their actual preference. Dr. Pope's paper on Hydrotherapy was thrust into a section mainly interested in the pharmacology of manufactured drugs. So far as could be seen, the large number of physicians connected with the many scientifically conducted sanitariums employing hydrotherapy in this country were conspicuous by their absence. The failure of these men to attend the Association is unquestionably a loss both to themselves and to this national association, which should be a rallying point and clearing house for all branches of scientific medicine. Papers on Roentgenology by Pfahler and others were also read before this section, occupying about half a session together with Pope's paper, and were well discussed, though doubtless the regular attendants on this section deplored the time lost to the discussion of the many novelties and crudities of pharmacal therapy demanding attention.

A paper on Radium was listed by Dr. Kelly, of Baltimore, to be read before the gynecological and abdominal surgery section, but I believe he was prevented from reaching Minneapolis by illness. Such a paper could not have been intelligently discussed in that section, and would merely have displaced the technical discussions on surgery to which the time of this section is principally devoted. My own paper on the "Early Recognition of Cancer of the Mouth" was appropriately read before the section on stomatology.

I again made an effort to secure action by the Committee on Sections and Section Work in favor of a new section on the Physical Forces in Medicine, but failed to secure mention of the matter in its report to the House of Delegates because of the absence of a petition presented newly this year, in spite of the petitions with several hundred names presented by myself and Dr. Werber at the St. Louis and Atlantic City meetings. It will be necessary, therefore, to present an entirely new petition next year, and this should be signed by as many members desiring to register in the section as possible.

A report on Physical Therapy at this meeting may be brief, indeed, for little opportunity was given for the reading of this class of papers and less for intelligent discussion, and a numerous and growing class of practitioners was not attracted to the meeting.

BOOK REVIEWS.

THORNTON'S MEDICAL FORMULARY. New (10th) Edition.
Price, \$1.50 net. Lea & Febiger, publishers.

This well-bound pocket handbook is intended to assist the beginner in formulating prescriptions applicable to cases which he wishes to treat, and the older physicians in prescribing the newer remedies. As it contains over 2000 prescriptions it may be useful for that purpose, but for that purpose mainly. The great danger is that as these formulae are arranged under an alphabetical list of diseases, the prescriber will become careless and simply copy the prescription for a given case without carefully considering its especial applicability. In the treatment of disease, the means toward a cure should be applied to each individual case and to each particular period and stage of the disease. The basic information upon which such treatment is founded must be gathered by continual, careful and exhaustive study, and not from a cursory glance at a handbook. Nevertheless, the handbook may have a place and be of assistance also in recalling certain facts to mind and in refreshing the memory. This handbook is one of the best of its kind and as such we heartily recommend it.

The Journal of Advanced Therapeutics

VOL. XXXI.

OCTOBER, 1913.

No. 10

Edited by DR. WILLIAM BENHAM SNOW

Associate Editor DR. ARNOLD SNOW

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MASSIVE X-RAY DOSAGE.

At this time there is noted a tendency on the part of some of the men who have latterly taken up the employment of radiotherapy to adopt the Sabouraud method of measuring x-ray dosage, employing pastilles and administering erythema doses; when the tendency in Europe, where this method of treatment has been in vogue for several years, is to abandon the massive doses and adopt the more conservative and safer plan so long in vogue in this country.

At the meeting of the Society for the Advancement of Science of Nimes in 1912 the sentiment was generally adverse to the use of the pastille. Prof. Bergonie at that time stated that in most cases the little pastilles were in the bottom of the box, where the manufacturer had placed them, implying that they were very little used. On visiting Sabouraud's clinic it was also found that the treatment of tinea-tonsorans was in process without pastilles, but with the time, distance and quantity measure in vogue. It is a certain thing that the pastilles, unless in a proper condition of moisture, do not change color uniformly under x-ray exposures. It is this uncertainty in the measure of dosage, together with the variable resistance of individuals, that renders their use not practical.

It was stated in an editorial in this journal sometime since that massive doses might be practicable in European clinics, but would not be in the private practice of men in this country, where perhaps the reputation of the operator is more at stake. It is to be feared that those who are now adopting the

massive dose method and their followers will in some instances come to grief for both reasons—the variable resistance of the patient and uncertainty of the means of measurement. Familiarity with the fact that long exposures to radiant light and heat will control a dermatitis when it does occur furnishes a valuable recourse. There is no doubt that if it were possible to employ some means which would give uniform effects it would be a valuable time-saver in case the skin of the patients treated were of uniform resistance, which every radiotherapist knows is not the case. This is demonstrated by the fact that varying lengths of time are required to produce the same effects with different patients. There is no claim or argument that will set aside these facts, and thereby justify the adoption of a method associated with so much danger by anyone on the theory of expediency, when by the use of a cumulative agent by a safer method it is possible to avoid all dangers and obtain the same result. Accidents occurring abroad from the employment of massive doses have so dampened the enthusiasm of American physicians not familiar with x-ray therapy that they have been deterred from adopting the use of the x-ray in therapeutics after visiting the Continent.

It is unfortunate that an agent so valuable in therapeutics as the Roentgen ray should not be applied in a safe and practical manner by those employing it, in order that a sentiment of prejudice should not be hereafter created against it.

The measure of the quantity of current which passes into the x-ray tube by a properly calibrated direct current meter to determine the volume of current producing the rays, together with a standard arrangement of terminal balls for measuring the voltage at the spark-gap, which measures the resistance of the tube, thereby determining the vacuum of the tube, is a standard and safe method. While it is true that tubes may vary a little in their output under the same conditions, that method is far more accurate than pastilles, which vary under different conditions of moisture and the operator's judgment as to various changes of color. The time and frequency of exposure and the distance at which the anticathode of the tube is placed are the only factors besides the current strength and vacuum of the tube to be considered in the matter of dosage.

Conceding that the first exposure may be made for 20, 30

or even 40 minutes with one milliamperere passing into the tube with the anticathode at twelve inches from the surface irradiated and the subsequent exposures on alternate days for 10 minutes, the erythema effect will occur within so short a time that there is no argument in favor of the massive dose. In fact, it is not prudent nor justifiable to run the risk of trouble from the single erythema dose, when the same effect can be brought about by the cumulative effect. The x-ray cannot be otherwise employed without danger. An extreme effect will never be produced with a dosage of from one to one and one-half milliamperes passing into the tube with the anticathode at ten or twelve inches from the surface of the patient when administered on alternate days.

Why the radiotherapists of this country should enter upon the employment of a system that is being abandoned abroad is difficult to understand. It is stated by a recent observer that in the clinic of Dr. Albers Schonberg, in Hamburg, that in the treatment of uterine fibroma he is now adopting the American method of short exposures. The measurement by the pentometer of Benoist to determine the quality of the rays is also inaccurate. It is readily demonstrated that when a low vacuum tube is used and a great volume of current is passing, producing a relatively large number of x-rays it will show the same penetration as a high vacuum tube producing a far smaller number of radiations. In other words, a large volume of radiation with a great volume of rays which is capable of producing a greater effect upon the skin would appear to produce the same effect on the pentometer as relatively harmless radiations from a high vacuum tube. It therefore should not be made a basis of determining the effect to be produced. There are many theories with reference to the x-ray which are not in accord with the work of the practical man that should be eliminated from the laboratory of the working therapist.

**THE ANNUAL MEETING OF THE AMERICAN
ROENTGEN RAY SOCIETY, HELD OCTO-
BER 1st-4th, INCLUSIVE, AT THE COP-
LEY PLAZA HOTEL, BOSTON, MASS.**

There were about one hundred members present, as well as many physicians from Boston and nearby New England cities. More than usual interest was shown in papers read and the full scientific discussions which followed.

Many of the papers were illustrated with excellent lantern slides, and the differential diagnosis of some abdominal diseases and visceral deformities as well as obscure sinus and ventricular maladies of the cranium were strikingly shown. One of the best papers from a therapeutic standpoint was by Dr. George E. Pfahler, of Philadelphia, on the use of the x-ray in many gynæcological diseases, especially its success in the treatment of uterine fibroids.

There was an excellent display of up-to-date x-ray apparatus and accessories—new designs in both water cooled and air cooled x-ray tubes. The exhibition of radiographic plates and lantern slides of others was a special feature and, in the writer's opinion, the finest yet seen in this country.

The chairman of the meeting, Dr. Pancost, of Philadelphia, is to be congratulated upon the conduct of routine business of each session, and his ability to keep the discussions down to time and strictly confined to the subject-matter of papers presented.

The next meeting of the Society is to be held at Cleveland, and the officers for the following year are: President, Dr. Sydney Lange of Cincinnati; Secretary Dr. Willis Manges of Philadelphia; and Treasurer, Dr. Leonard Rue of Buffalo.

E. C. T.

ANNUAL REPORT UPON THE ADVANCES IN
ROENTGENOLOGY.*

G. E. PFAHLER, M. D., CHAIRMAN, PHILADELPHIA, PA.

This report must in no sense be considered complete. The advances in this subject during the past year have been so extensive that neither my time for preparation, nor the time allotted to me for my report, permits giving more than a partial record of the meritorious work recorded by the various authors in this field. The absence of a review of the good work done by American authors must not be understood as a lack of recognition of its value, but is omitted because it can easily be found elsewhere in current literature by those who are willing to look. There is more meritorious work in general omitted from this report than that which time will permit me to record. I am, therefore, only able to record some of the advances which seem to me important. All references to advances made in equipment have been entirely omitted.

ROENTGENTHERAPY.

(1) Probably the most decided advance of the past year is the general recognition of the value of *Roentgen Therapy in Gynecology*. There is on record considerably over one thousand carefully reported cases that have been treated. The general recognition of the value of this treatment shown by gynecologists and roentgenologists, particularly in Germany, is the best proof of the value of this treatment. At least two books have been written upon the subject, and the current literature is so extensive that it would be folly to attempt any sort of a condensed report. At the recent International Medical Congress in London, a whole session of the combined sections of Gynecology and Radiology was given up to the consideration of this subject, and the testimony of the roentgenologists was no more enthusiastic than that of the gynecologists.

(2) Hooton (*British Med. Journal*, June, 1912) treated 14 private cases of Graves disease; 10 apparently cured; 9 being

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City Sept. 2d, 3d, and 4th, 1913.

quite well over a year and 1 for six months; 2 have recently given birth to children, though they had been previously childless; the remaining 4 showed remarkable relief from symptoms and returned to work. Of 17 hospital cases, 7 were cured, 4 relieved, and 4 others showed a little improvement. One was operated upon with a fatal result. Altogether the cured and greatly relieved numbered 80 per cent. Nervousness, dyspnoea, tachycardia and tremor were remarkably lessened or disappeared. Weight increased.

(3) Good results in Graves disease have also been reported by Florence Stoney (*Arch. of the Roentgen Rays*, January, 1913, p. 320). She has treated 48 cases since April, 1908; 10 in private; 7 gave up treatment too early; 14 completely cured; 22 derived great benefit, resumed ordinary habits of life and returned to work, they still show slight symptoms; 4 were unsatisfactory; 1 did not do well, and in which the pulse only fell from 136 to 112. She was operated upon and died in 12 hours. Twenty of these were married women; 28 unmarried, ages varying from 17 to 63. The patients were treated twice a week for a month, then rested two weeks. The treatment was carried to the production of erythema.

(4) Weil (*Bulletin de la Societe de Pediatrie*, Paris, October, Vol. XIV., No. 7) calls attention to the remarkable efficacy of the Roentgen exposures in reducing the size of an abnormally large thymus. His four cases bring to eleven the number on record, in all of which the measure proved successful. He does not apply large doses, finding the mild amply sufficient. There was no further trouble forty-eight hours after exposure to from 1 to 5 H units, with a filter. He does not think it necessary to do more than reduce the size of the thymus; it is not necessary to destroy it altogether. His patients were infants between 2½ and 9 months old. The number of exposures ranged from five to twelve, as a rule.

(5) Stewart (*Archives of the Roentgen Ray*, April, 1913, p. 414) records a clever method of treating carcinoma of the oesophagus. He places a silver tube into the stricture. This localizes the exact position of the cancer, and will set up secondary rays from the silver. The patient can be fed through the tube. The diaphragm can be reduced so as to just include the special area. This will allow a full dose to be given in many directions.

(6) Suligmann (*Münch. med. Woch.*, March 25, 1913, p. 637) reports a remarkable cure of sarcoma under x-ray treatment. A girl of 24, in August, 1911, had a tumor which filled the entire abdomen. A ten-pound intra-ligamentous tumor was removed, and found to be spindle-cell sarcoma. After three months the patient seemed to be well. Recurrence occurred in nine months, and when examined, November, 1912, the recurrent tumor filled the entire abdomen again, associated with redness and tenderness. She had signs of metastasis in the twelfth dorsal and first lumbar vertebræ, which was also demonstrated by radiographic examination. The abdomen was opened again, and the tumor was found to be larger than the original, and everywhere adherent. It was not removed, and the abdomen was closed. The patient was given x-ray treatment, 55 X, from December 10th to December 31st, 1912, and 66 X from January 15th to January 28th, 1913, total dosage 121 X, given from ten different points. In addition she was given intravenous injections of arsacetin. Eight weeks after beginning treatment the patient was demonstrated before the Physicians' Congress in Hamburg, entirely free from any evidence of disease.

(7) Kienböck (*Wiener med. Woch.*, 1912, No. 19) reports two remarkable cases of Roentgen treatment of sarcoma. The first was a large mediastinal tumor, secondary to the removal of a lympho-sarcoma from the neck. This showed a remarkable reduction at the end of six treatments. The patient is still well five years later, and complains of no symptoms.

The second case had his shoulder joint enucleated because of a spindle-cell sarcoma. Three months later there were recurrences the size of a walnut. Roentgen treatment caused a disappearance of the tumor, and the patient was still well five months after treatment.

The author believes that before operation is undertaken Roentgen treatment should be tried, and he believes that within a short time one can tell whether or not he is likely to get good results. Especially does he recommend treatment in rapidly growing recurrent tumors.

(8) Quadrone (*Reforma Medica*, Naples, February 8, 1913, Vol. XIX, No. 6) reports further research upon the effect on permanently high blood pressure of exposure of the ardenals to the Roentgen rays. He treated five cases of per-

manently high blood-pressure. In four of the five patients the blood-pressure was materially reduced, and the subjective condition much improved, but no appreciable influence was apparent on morbid conditions in the heart and kidneys. His experiences confirm the reduction in the blood-pressure which is possible by exposures of the adrenals where previously the adrenals had been functioning to excess. The epinephrin disappeared from the blood after the exposures. His findings confirm in every respect those reported by Zimmermann last year on the reduction of the blood-pressure under radiotherapy of the adrenals. They also confirm Decastello's report of the changes in the adrenals after exposures to the Roentgen rays. It is only in a comparatively small proportion of the cases of excessive blood-pressure that excessive functioning of the adrenals is responsible for the hypertension. The finding of epinephrin in the blood suggests the possibility of this, and explains the benefit from the exposures. Zimmermann obtained a more or less pronounced reduction in the blood-pressure in 15 of the 16 patients thus treated.

(9) Delherme and Rye have made an excellent report upon the radio-therapeutic treatment of sciatica (*Archives of the Roentgen Rays*, March, 1913, p. 388). In October they reported the results upon twelve cases, all being thoroughly examined first by Dr. Babinski. In all cases the tendo-achilles reflex was particularly studied. In one case it was exaggerated with epileptoid trepidation; in 7 cases enfeebled or abolished; in 3 cases unaffected, and in 1 case not recorded. In 2 of the 3 cases in which the reflex was unaffected no improvement followed. Babinski has shown that modification of the Achillean reflex indicates undeniable perturbation in the state of the sciatic nerve. Up to the time of report 10 cases remained cured. All cases had been previously subjected to the most careful treatment, both pharmaceutical and physical; the cautery, injection of hot air, epidural-injections of cocaine, and the like, without lasting results.

Technique consisted of an irradiation over the lumbar region at the point of emergency of the sciatic nerve, and at the various painful spots; 3 irradiations to each region, each separated by a week. After the first series of three seances, he allowed an interval of three weeks, one-third of a Sabourand dose being given in the three sittings.

(10) Schmidt (*Roentgentaschenbuch*, IV. Band), in his experiment upon increasing the sensitiveness of the tissue under the action of the rays, found that through good compression of the skin during Roentgen treatment he could give at least double the dose, and active hyperemia produced by any method gives a decided increase in the sensibility of the tissues to the treatment. As an example, an old case of epithelioma, which did not react after twenty treatments, disappeared promptly after rendering the tissue hyperemic by mercury light, and following immediately with x-ray treatment.

Similar results are obtained in psoriasis. In addition to compression desensibilization can be produced by the injection of adrenalin, as suggested by Reicher and Lenz. Such injection permits the use of five times the normal dose. The advantage is the abbreviation of the duration of treatment.

(11) Werner, in his paper upon "Radiotherapy and Tumors," before the International Congress for Physio-Therapy, refers to, and recommends the use of cholin, in 10 per cent. solution, as an intravenous or intra-muscular injection, in combination with Roentgen and radium treatment. He cautions, however, against the danger of a possible dermatitis, because of the increased sensibility produced by the cholin. He begins the injections conjointly with the Roentgen therapy, and continues them for two or three weeks; then allows an interval of five weeks.

Bêclère, before the Fourth International Congress of Physio-Therapy, made a report upon four additional cases of hypophyseal tumors that were successfully treated by Roentgen therapy. In all these cases the patients had the classical symptoms of acromegalia with deepening and widening of the sella-turcica. He used hard distant rays filtered through 1 m.m. of aluminum, and applied three-eighths of a dose at each sitting.

DIAGNOSIS.

(1) Kreuzfuchs (*Berl. klin. Woch.*, 1912, No. 33) finds as evidence of duodenal ulcer an increased antrum peristalsis of the stomach, with rapid filling of the duodenum and small bowel. These point to some duodenal affection; but he also finds as evidence of duodenal ulcer a persistent deposit of bismuth in the first portion of the duodenum several hours after meal time.

In a suspected case the author gives a glass of bismuth and water mixture, upon an empty stomach; examined the patient promptly, and then again at the end of an hour. Generally at this time the stomach is empty and the retained bismuth is clearly shown. At this second examination the regular Reeder meal was given, and the usual course of investigation followed.

(2) Duodenal and gastric ulcers have been definitely diagnosed, especially during the past year, and the accumulative evidence from numerous authors shows that the Roentgen method is the most accurate for the diagnoses of these two conditions. The subject is too large to even be reviewed in this brief report, but represents one of the distinct advances of the past year. Readers who are interested in this subject may be referred to the special contributions by a number of others, as well as myself. (*Am. Quarterly of Roentgenology*, February, 1913.)

(3) Lippman and Quiring (*Fort. a. d. Gebiete d. Roentgenstr.*, Vol. 19, No. 4, p. 253) have made a study of aortic lues. The examinations were made by oblique view; plate anteriorly, angle 30 to 40 degrees. Teleo-photo distance 1.5 m. The breadth of the aorta was found to be 3 cm.; 160 cases were examined, one of which showed a positive Wasserman reaction. In 27 of these observations were controlled by autopsy. A tabulated study of the last 30 cases showed:

The classical age for aortic lues is 45 years. In 24 of the 30 cases the shadow of the aorta was found to be deeper than the shadow of the ribs. In 22 cases the breadth of the aorta was over 3.5 cm. (In health this is never over 3.5 and nearly always under.) In 107 other cases, 97 showed an increase in density, and 100 an increase in width, therefore he concluded that an increase in density and depth is evidence of syphilis. These changes were even recognized in cases in whom were found no murmur. In addition to the diffuse dilatation, in 160 cases there were 29 aneurysms, and in two a bronchial tumor.

(4) *The diagnosis of pregnancy.* During the past year there have been several contributions to this subject, the consensus of opinion being represented by the contribution of Patocki, Delherme and Laquerrière (*Bulletins et Mémoires de la Société de Radiologiemédical de Paris*, November, 1912). The youngest foetus the authors have been able to recognize

was 5½ months. At term they were able to recognize not only the cranium and the vertebral column, but the thoracic cage, and a good portion of the parts of the foetus. At 5½ months only the cranium and spinal column is shown.

(5) Insufficiency of the ileo-cecal valve has been studied by Gradel (*Fort. a.d. Woch.*, May 2, 1913, Vol. 20, No. 2, p. 162). He agrees with Herz and Cramer that under normal conditions colonic contents do not pass from the cecum into the ilium, and that such passage indicates some pathological condition in the region of this valve. This pathology may consist of tumors, involving the sphincter, cecum or cecal region, or of a cecal catarrh, or of traumatic adhesions. This insufficiency can be demonstrated by a bismuth, or barium sulphate meal, in which case the bismuth is likely to be retained in the ilium beyond 12 hours, and the barium sulphate longer than six hours. It may also be demonstrated by colonic injection of opaque solution, in which instance the opaque solution passes into the ilium through the ileo-cecal valve, or may be crowded from the cecum by palpation into the ileo-cecal valve. The author also recommends that the patient be examined a second time, after defecation following the colonic injection, and if the instance is that of ileo-cecal insufficiency, the opaque solution will have been crowded through the ileo-cecal valve. This diagnosis is emphasized when the patient's clinical symptoms point toward some pathological condition of the small bowel. Surgical intervention is only indicated when the pathological process is of such a nature that can be permanently relieved by operation.

PHYSIOLOGY, BIOLOGY AND PATHOLOGY.

(1) Meyer-Betz and Genhardt (*Munch. med. Woch.*, 1912, No. 33, 34, p. 1793-1861) investigated the influence of the purgatives upon the bowel movements in healthy men. Their first experiments were made upon cats, and then upon healthy young men from 14 to 16 years of age. They found that the infusion of senna acted almost entirely upon the large bowel. It interrupted the normal action of the bowel, and increased the otherwise slow peristaltic action. The large doses of aloes increased the general tone of the wall of the bowel even to the extent of producing spasms.

Castor oil acts upon the entire gastro-intestinal tract. Its action is noticed especially upon the filled small bowel. In the colon there is a relaxation of the segmentation, and interruption of the small normal peristaltic movements. By contrast there is an increase in the large peristaltic movements of the bowel, which leads to rapid emptying.

Jalap was injected, which caused first of all an increase of the secretions of the small bowel. The large bowel became quickly filled; segmentation was absent; direct stimulation of the peristalsis was scarcely noticed, but the rapid filling of the large bowel with gas and fluid led to rapid emptying of the bowel.

With saline purgatives the action was similar to jalap, but somewhat increased.

With calomel the peristaltic action of both small and large bowel was increased apparently by direct stimulation of the walls. The bowel contents is carried through the ileum by rolling movement, and in the large bowel the action is similar to that of senna.

(2) Magness (*Fort. a. d. Gebiete d. Roentgenstr.*, Vol. 19, No. 1, p. 1) made an investigation of the effect of opiates upon digestion, and found that while the stomach of a cat empties itself normally in three hours, after the injection of 0.02-0.04 of morphine it required 7 to 25 hours. Experiments on dogs showed the same thing. No effect on the small bowel could be seen. If the injection was given after most of the food had entered the small bowel, then delay was shown in this section. Anti-peristalsis in the proximal colon was not influenced by morphine. Tincture of opium had a similar effect on the cats, but proved very poisonous. Pantopon has a pronounced hypnotic effect, and influences the respiration less than opium. (1 gr. of pantopon equals 5 grs. of opium.) Normally there is no delay in the oesophagus. In some cats after an injection of pantopon there was considerable delay, and in one cat the oesophagus had not emptied itself until two hours. Normally the meal passed from the small bowel into the large bowel completely in three to five hours from the time it was given.

There was considerable delay under the influence of the drugs, but this was probably due to the delay in the stomach.

(3) Bergmann (*Münch. med. Woch.*, April 8, 1913. p.

777) in his experiments concerning the effect of drugs upon intestinal peristalsis, made upon human beings in the Altona Hospital, found that pilocarpin and physostigmin (vagus excitators) produce strong bowel contractions and bowel spasms.

Atropin (vagus depressor) decreases the movements, the tone, and the segmentation.

Adrenalin (sympatheticus stimulant) causes momentary changes, complete rest and maximal dilatation.

These experiments indicate that the vagus is the excitor, and the sympathetic nerves the depressor of the intestines.

Atropin causes the ileo-cecal valve to remain open, and thus allow large quantities of bismuth to enter the small bowel.

Pilocarpin causes deep segmentation, but in a case of spastic obstipation, for some unknown reason, the peristalsis was increased.

(4) *The relation between the condition of the stools and the motility of the stomach and character of the stools in hyperacidity and achylia* (*Archiv. für Verdauungs-Krankheiten*, December 12, 1912) Jonas endeavors to prove that the motor functioning of the intestines depends largely upon the stomach, as hypo-motility of the stomach is associated with an abnormally rapid passage of the contents through the intestines, and the reverse is true where there is hypo-motility. Severe constipation may be present when the passage is delayed through the lower segment of the large intestines, although the contents may pass at the normal rate through the upper bowel. The diarrhoea does not justify any conclusions as to the hyper-motility of the whole intestinal tract, as it may be secondary to disease of the stomach as well as of the small or large intestine.

Unless the lower segment of the large intestine escapes, achylia usually causes diarrhoea, as the achylia hyper-motility extends throughout the intestinal tract. In this case normal or hard stools may be observed and even constipation, so that constipation does not necessarily indicate lack of achylia. On the other hand, if in spite of known achylia the stools pass slowly through the upper large intestine, not reaching the splenic flexure in at least six hours, some obstruction in the stomach or intestine should be suspected. Constipation is the rule in hyperacidity, because this checks the evacuation of the stomach on account of the exaggeration

of the pyloric reflex. Hyperacidity may be the result of a primary hyper-motility, and thus diarrhoea may be present.

These conclusions are based on a number of cases described in detail. They explain the variations in the stool liable with hyperacidity.

(5) *Action of the x-rays on the eosinophilis.* Aubertin and Giroux (*Presse Medicale*, July 13, Vol. XX., No. 57) conclude that the x-rays cause a general increase in leukocytes of all kinds, which is followed by a destructive action. In normal subjects this results in an increase of the neutrophils. In patients with myeloid leukemia the neutrophils are also chiefly increased because these cells are still in a large majority in the blood, although greatly modified. In a case reported by the authors, in which the eosinophils reached 65 per cent., the leukocytosis was especially an eosinophil leukocytosis. The x-rays therefore do not act on the blood like the infections which produce an exclusively neutrophil reaction. They act equally on the eosinophils. In moderate doses they cause these cells to migrate into the blood, as in the patient reported. In larger doses they destroy them, as in the case of leukemic patients treated by the x-rays.

(6) Nemenow (*Zeitschrift f. klin. Medizin*, Bd. 65, H. 5 and 6) had the privilege of making a pathological examination of a case that had been treated for leukemia, and died of typhoid fever some time after he was clinically well, and after the leukocytes had returned to normal. This gave the first opportunity of this kind of study for the study of the spleen, in which he found no typical changes, and only an increase of the connective tissue, thickening of the capsule, etc. The trabeculae were thickened, the normal mal-pigeon bodies were scarcely demonstrable, and in their place were found normal vessels with fibrous tissue rings, and isolated lymphocytes. The bone marrow had the character of fat mixed with lymph; otherwise there was no depreciable change.

(7) Freund and Kaminer studied *the chemical action of the Roentgen Rays and of radium on carcinoma* (*Über chemische Wirkungen von Röntgen und Radiumbestrahlung in bezug auf Carcinom.*) (Abstract from *General Surgery*, July, 1913.) The authors applied toxic doses of x-ray and of radium to portions of skin in order to determine the effect the rays would have on the ether-soluble fatty acid found in

normal tissues and serum. This fatty acid has a prophylactic action on carcinomatous tissue. The results of the experiments follow: toxic doses of x-ray caused the fatty acid normally present to disappear, whereas radium liberated an ether-soluble fatty acid from the pathologic nucleoglobulin of the carcinoma when the latter was exposed. Cancer cells lose their power of making use of carbohydrates when the tissue is exposed to radium emanation.

Exposing of skin to the x-rays caused the ether-soluble fatty acid to disappear, but exposing the same piece of skin to radium again liberated the fatty acid normally present. The authors believe that the x-rays couple the acid to some substance insoluble in ether, whereas radium restores the solubility of the acid by breaking the chemical bonds that unite it with the insoluble substance. These facts may have practical application in cases of x-ray burns, etc., where a radium treatment may restore the ether-soluble fatty acid that has the power of destroying carcinoma cells. Over-exposure with the x-ray lowers the local resistance and makes carcinoma possible. Radium has this therapeutic value, that it robs the injurious substance in carcinomatous tissue of its pathological properties.

TECHNIQUE.

Schmidt (*Fortsch. a.d. Gebiete d. Rontgenstrahlen*, Vol. XIX., No. 3, p. 209) records some experiments to show the value of filters in increasing the penetration of the rays.

Test I. Burger therapeutic tube, with 4 m.a. of current, which with a Bauer quantimeter registered 6.5, and upon a Wehnelt 6.5 when no filter was used, showed with a filter of 1 m.m. of aluminum, 8.5; with 2 m.m. of aluminum, 9.5, and with 3 m.m. of aluminum 10.5.

Test II. With a Bauer tube and 1.2 m.a. upon the Bauer quantimeter, without filter, registered 9.5; with 1 m.m. of aluminum 11.5; with 2 m.m. of aluminum 12.5 and 3 m.m. of aluminum 13.5.

Test III. Water cooled tube. 2 m.a. of current; Bauer quantimeter, without filter, registered 9.5; with 1 m.m. of aluminum 11.5; 2 m.m. of aluminum 12.5, and 3 m.m. of aluminum 13.5.

It must not be forgotten that while the penetrative value

of the rays is increased, the total quantity is considerably decreased.

Discussion.

Dr. John W. Torbett, of Marlin, Texas: I haven't anything to say about the report, except that it is first class and as thorough as could be given in the time allowed. I wish to add one thing in regard to using the x-ray in treating neuritis, especially sciatica. I have been using it for five years, and have been reserving it for that class of cases that fail to respond to other lines of treatment. I suppose I treat probably over a hundred cases of neuritis a year, and I find a good many that are not benefited by the other modalities. For the past five years I have been using the x-ray, always exposing the lumbar portion of the spine, and in those cases of neuritis of the arm and shoulder the lower cervical and upper dorsal. Some of my cases I thought were chronic and some tubercular. There was one case in particular in which the leg was enlarged and edematous, and the pain was so severe that the patient could not obtain sleep. The x-ray treatment caused a disappearance of the pain, the edema left, and the patient remained well. I consider those severe cases probably tuberculous or malignant. They had symptoms of true sciatica, and there was no involvement of the sphincters. So long as the sphincters are not involved in those sciatica cases and only one leg involved, even though it be severe, and the other lines of treatment have not benefited, I have found the x-ray the very best form of treatment for those cases.

Dr. G. Betton Massey, of Philadelphia: I think Dr. Pfahler alluded to the use of heat in increasing the effect of the x-ray. I want to mention, in this connection, a little effort to test the theory advanced by de Keating-Hart, who called attention to the increased activity of the x-ray when the part was heated. I have tested this recently in two cases, with results that seem to be very positive. One was a case of carcinoma of the glands of the neck, after a second knife operation, the amount of infiltration indicating that the disease had doubtless surrounded the great vessels of the neck. When I first saw the case there had been two operations by the knife, the last but a few weeks previously, already followed by extensive recurrence. In order to test this matter I destroyed the overlying

portions, so far as was safe, by bipolar zinc ionization, leaving a large cavity, probably an inch and a half deep, in the direction of the carotid artery and internal jugular vein, very distinctly carcinomatous. I then began Roentgen ray treatments, each raying immediately preceded by heating with the spot light of a powerful arc lamp, focused in the cavity. The arc light was carbon with an iron core. The light was concentrated on the bottom of the wound, about the size of a half dollar. It was very painful, the pain being felt at the base of the tongue. The patient could hardly stand it for the five minutes during which it was heated up before the x-ray application. In order to enable him to stand it the light was interrupted every few moments. There was evidence of a more rapid local death of the very protuberant malignant granulations than was produced by the raying alone, followed by a smoother and better appearance in the bottom of the wound than there had been before, and a general contraction of the wound. The experiment was halted by increasing weakness of the patient, probably from the effects of malignancy in some other part of the body. In another case this carbon arc light was thrown over a somewhat larger area of skin overlying a case of carcinoma of the glands of the neck, following a successful ionic treatment of breast cancer, the light application being made for five minutes before each x-ray application, and I think in this case that the immediate results are promising. In other words, a greater effect was obtained than was produced by the simple x-ray in these otherwise hopeless cases.

Dr. F. Howard Humphris, of London: We have tried in London to duplicate the results of Deherm and Rye in the treatment of sciatica, but have not been able to do so. I do not say that our cases haven't got relief, but we followed very carefully their technique, and we have found that if we cured half the cases we considered ourselves lucky. Their reputation stands very high, and I think they had a lucky set of cases.

Psoriasis can be cured by the x-ray, but it will come out in another place very shortly. Also in leucocythemia you can get marvelous results. A man I saw in this city sometime ago had a very advanced case. I think he was treated by one of the members here. He was in bed, and it was thought he was going to die. For two and a half years after x-ray treat-

ment he went on with his work. I then looked at his blood and there was not a single normoblast. Two months later he died. Another case that I saw in London was able to go on with his work, and died suddenly. I think patients should be told that we can give them a happy end, but that we cannot prolong life beyond three years.

Dr. Pfahler: I appreciate the discussion and criticisms very much. All Dr. Humphris has said is true, and does not differ from the report I made. The report on the blood was purely biological, and was not on the therapeutic efficacy of the x-ray on leukemia. I think it is true that there is no case that has lived over four years under any treatment. We cannot promise them a cure yet, only a benefit.

I referred to the article on sciatica, not because it was new, not because it is the first group of cases treated by the x-ray, but because those cases were studied under the control of Dr. Babinski, whose reputation as a neurologist no one will question, and because he referred the cases and watched them during their progress, and therefore I think we can accept that report with a great deal of confidence, and while we may not be able to duplicate the results, the fault is perhaps ours.

This study of penetration was done with the idea of placing on record the value of the increase in penetration.

Dr. Massey calls attention to the value of heat in increasing the sensibility of the tissues. That too was referred to in last year's report and discussion. The heat does probably increase the sensibility, perhaps more by increasing the hyperemia than anything, but we must bear in mind that in increasing this sensibility we are liable to increase the sensibility of the skin more than the deeper tissues, and you will be in more danger of producing a burn unless you in some way eliminate the superficial hyperemia.

OSTEOSARCOMA OF THE INFERIOR MAXILLA—A
CLINICAL REPORT.*

BY F. C. TICE, M.D., ROANOKE, VA.

The annals of radiotherapy, and its congeners, in the treatment of malignancy are in their opening chapters. Volumes will be written before a thorough elucidation of the subject is attained. In the report which follows there should be found something suggestive as to causative conditions, preventive measures, and, it is hoped, of value in methods of cure. This patient, a railroad section foreman (referred to me by Dr. H. E. Jones), sixty-three years old, six feet two inches in height, weighing two hundred and twenty-five pounds, complained of a swelling of the lower part of his face, the pain from which was so intense that large and frequent doses of opiates with other analgesics gave but partial relief. His family history was negative. His own health and vigor had been remarkable, showing twenty-five years of continuous service with the Norfolk & Western Railway, during which period he had lost but ten days. He had always been a hearty eater, but had never in any other way dissipated, and was free from specific taint. There was no history of injury.

On April 12, 1910 he suffered an attack of ptomaine poisoning from tainted pork, which was near being fatal and from which he made a tedious convalescence. Before fully regaining strength he contracted, in October, 1910, a pneumonia of profound type, recovery from which was protracted and yet in progress when, in February, 1911, a tumefaction presented over the right ramus of the inferior maxilla closely simulating parotitis, or mumps, which it was at first supposed to be. This was accompanied by a stiffness in the parts with diffused pain, including the teeth and the bone itself. This swelling gradually extended along the bone, subsiding in the regions originally affected, until it had traversed the mandible from condyle to condyle, from coronoid to coronoid. Early in the case the pain in the first and the second lower molars of the right side was so marked that these were extracted

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City Sept. 2d, 3d, and 4th, 1913.

in the expectation of securing some measure of relief, to no avail.

Having reached the left temporo-maxillary articulation it remained stationary for an appreciable time, and then began to rapidly retrace its course, increasing in intensity until, on April 28, 1911, when he came under my observation, I found a continuous, homogeneous mass of which the bone itself was a part, extending from the groove of the facial artery on the left to a point just posterior to the mental foramen on the right, filling up the space posterior to the arch, hard as ivory, and pressing on the upper part of the larynx. There was no evidence of a periostitis, the pathological condition being wholly in the bone proper with the periosteum distended and attenuated. The sublingual and the submaxillary glands were enlarged, a stenosis of the mouths of their ducts resulting in bilateral ranula. The jaw was so fixed that the upper and lower teeth could be separated but three-eighths of an inch, while there was a well developed pyorrhea alveolaris both above and below; all of the lower teeth were loose in their sockets; the tongue was foul; the breath fetid. The soft tissues were hot, with the muscles rigid, but not otherwise affected. Obstinate constipation was a concomitant. The pain was likened by the patient to that which would be caused by a strong blacksmith holding the jaw with red hot pincers and exerting his full strength in an effort to pull the jaw from the head. This was constant. It was my conviction that this man could not exist two weeks longer under the existing conditions.

An x-ray examination showed a homogeneous mass of significant appearance. There was no microscopical examination, as I deemed it not necessary and desired to avoid traumatism. The patient was tremulous as with palsy. The systolic blood pressure was 175 mm., the pulse 108, the temperature sub-normal, 96.2.

In the conduct of this case attention to the digestive tract and the usual emergency measures were supplemented by daily treatments, using the x-ray, light and high frequency as indicated. Wharton's ducts were opened by gradual dilatation of their mouths and their pent up contents released; for the pyorrhea iodine and high frequency were applied. The parts were rayed on alternate days from a six-inch medium

tube at twelve inches for from eighteen to twenty minutes. On the days intervening he received either light or high frequency for from thirty to fifty minutes, according to conditions.

Notwithstanding these somewhat vigorous measures, while there was decided alleviation of the pain, the progressive invasion, though considerably modified, was not arrested, and on June 17 the right temporo-maxillary articulation was again reached. At this time the area involved extended from a point just back of the right mental foramen, where there was a decided nodule, to the articulation.

Between May 10 and June 20 he received 120 cc. of anti-streptococcic serum with no appreciable effect other than local pain and discomfort at the site of the injections. Possibly a larger dosage would have shown some favorable result. Following the raying of June 20 (which was the twenty-sixth application of this agent) there was a decided dermatitis with depilation of the right side of the face, and the daily treatment from that date was confined to light and high frequency alternately given for from thirty to forty minutes until July 13, when raying was resumed, the affected parts being bombarded on alternate days for from twenty to thirty minutes through a sole-leather filter. On August 9 there was an invasion of the right temporal region, malar bone and outer orbit, which, by increasing the time of the exposures to forty-five minutes, was checked and overcome by August 23.

Treatment was suspended August 31, due to my absence from the city, and resumed September 12, the patient being discharged on September 23 with a normal jaw, firm teeth, and the ability to raise a full beard, since which date he has remained hale and hearty. At no time were the articulations proper involved.

It is of interest to note that this man was rayed for an average of twenty minutes every other day from April 28 to June 20 before experiencing a dermatitis, due, no doubt, to the intervening light applications, and from July 13 to August 31, and again from September 12 to September 23, averaging thirty-five minute exposures without ill effect, and that during the latter period the function of the hair follicles was restored. So much for continuous active raying in conjunction with light and high frequency as controlling agents.

In view of the previous reports by the author, and others, of the efficacy of our methods in all acute infections, it is rational to assume that had the initial infection in this case come under these influences there would have been a prompt restoration to health; or if, even later, when the pneumococcic infection took place, had it been conquered—as is possible by our measures in a matter of days—the strength and resistance of this man would have been conserved and the subsequent malignancy averted.

From this standpoint the whole history of this case, while a triumph for our methods in extremis, is an appeal to each one of us, and to the profession at large, for the prompt adoption of these measures in all acute infections. Anything that will cure when all else failed should cure before anything else has been used, thus avoiding complications and preventing sequelae. Gentlemen, this truth to those who are familiar with this great discovery makes it seem criminal to keep the general public in ignorance of the facts.

And now, my fellows and co-workers with this subtle essence which pervades all creation, whose withdrawal from the universe would mean annihilation, I desire to here deduce for your consideration an axiom which at some early day may become a maxim, which is: “Quae in extremis sanabunt eadim ab initio.” A literal translation of which would be, “That which will succor when all else has failed will cure promptly before anything else has been tried.” Or, more concisely, “What will cure in extremis will do likewise from the beginning.”

Heretofore we have been using the various manifestations of this force as a last expedient. It is now known to be the most efficient primal agent. A prophesy has been fulfilled, for

The First is Last,
And the Last is become First,
And the First and the Last is
ONE.

Herein there lies a mystery and also a great truth.

709 South Jefferson Street.

Discussion.

Dr. G. Betton Massey, of Philadelphia: I feel a little doubtful about the diagnosis. May the case not have been one of osteomyelitis?

Dr. William Benham Snow, of New York: Isn't it possible that the result of treatment confirmed the diagnosis? There is no type of malignancy so susceptible to x-ray as sarcoma. I watched a case of Dr. Coley's at the Memorial Hospital ten years since, a sarcoma of the femur. It was in a boy about sixteen years of age. The tumor dwindled away under the x-ray treatment and was kept in abeyance for a long time. The boy refused to have his limb amputated, and there was nothing else to do but use the x-ray. What the ultimate result was I do not know. It was a case of sarcoma. The giant-celled sarcoma is the least malignant type of sarcoma. Its growth is rapid and destructive, but it is the most vulnerable form of malignancy to x-ray or radium.

I have had considerable experience with sarcoma; some were treated with the x-ray only, and are living and well to-day. One case, inoperable, treated ten years ago, was an abdominal case in which the Coley serum had been used until a time was reached that it did not benefit it. It was reduced from half the size of a man's head to the size of an orange, when the patient became intolerant to the serum. Under the x-ray the woman made a perfect and rapid recovery. That was a giant-celled sarcoma. I have had three cases treated with radium that are well after three years. I believe radium to be a specific in giant-celled sarcoma. The action of the x-ray is very similar to the action of radium.

As I said in my opening remark, in Dr. Tice's case the result is rather a diagnosis. A case of periosteitis would not necessarily get well under that treatment. If it did it is quite an advance in therapeutics. I believe we are justified in assuming that that was an osteosarcoma from the results that have been obtained in these cases with the x-ray and radium.

I did not observe whether he used a filter, whether he used the x-ray from a static machine, or whether he used a milliamperemeter and knew what dose he used. Twenty-five minutes' exposure with one apparatus might be equivalent to ten minutes with another. I think the doctor is to be congratulated on the result in this case, and I think it ought to go into the records as a case fairly well proved, though we admit the fact that there was not a microscopic examination. Few of us now allow tissue sections to be taken for diagnosis.

Dr. Louis Von Cotzhausen, of Philadelphia: I had a case some years ago of a growth on the upper end of the tibia right below the insertion of the ligamentum patellae. It showed every possible symptom of sarcoma. It was diagnosed as sarcoma by one of our leading surgeons of Philadelphia. The patient refused amputation of the leg. She was also afraid of the x-ray, and bitterly opposed to any treatment of that kind. In extremis I resorted to nothing more severe than a 500-candle power lamp, which was almost ridiculous

under the circumstances. I exposed the spot for an hour at a time. The peculiar feature of it was that it did not cause any local burning except on the surrounding tissue, while this growth was at its height. As it gradually grew smaller and smaller under this method of treatment, the skin over it became more and more sensitive, and finally when it had disappeared entirely—and it has not returned—the skin became very sensitive, so much so that it burned more readily than the surrounding tissue. I bring up the case for some one to tell me what it was if it was not a sarcoma, and to illustrate the difficulty we sometimes have in making a microscopic examination, and still we dare not bring up such a case before a scientific body because a microscopic examination was not made.

Dr. Massey: I want to explain that my remark about the lack of diagnosis was only intended to characterize my ideas of the very remarkable result so far as I know. I do not want to be understood for a moment as saying that he should have made a diagnosis, for if I did I would go against my statements for the last ten years, that there are more people being killed as a result of interference with malignant growths for the purpose of getting a specimen for microscopic examination before efforts are made for the complete removal or destruction of the growths. I do not wish for a moment either to appear as doubting the diagnosis. It seems to me that everything points to the correctness of the diagnosis made, though it did not occur to me that there was a very slight possibility of its having been one of those subacute or acute cases of osteomyelitis of which I have heard but never have seen an instance. I think the diagnosis should not be questioned really.

Dr. F. Howard Humphris, of London: There is a Dr. Jekyll and Mr. Hyde in us all, and the Hyde part would have liked to see a section. A criticism that is frequently made in Germany and France and England is that the dosage is not definitely stated. If that is not done it is very difficult to duplicate results.

Dr. Tice, in closing: In regard to the dosage, I used a six-inch tube excited from a transformer, and was guided entirely by the color of the tube. Using what my experience has taught me to be a medium tube, at a distance of twelve inches from the surface.

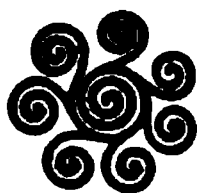
The principal point seems to be the question of diagnosis. This case was studied very carefully. I have had a large and extensive experience in the microscopic examination of tumors, and am convinced that this was a decidedly malignant condition. There was no periosteitis, as I stated, and if I had made a microscopic examination I should have expected to find not only giant cells, but spindle cells as well.

As stated, it was desirable to avoid traumatism and inevitable metastasis.

I much preferred to restore this man to the bosom of his family, hale and hearty, than to put him six feet under sod, and to have been able to write over him that he died of unquestioned osteosarcoma.

I have a medical friend in Roanoke of whom I am indirectly reminded by the remarks of Dr. Massey. A few years ago I had a case of hydatid cyst (uterine), on which I operated and the patient recovered. In a short time he had a similar case, after which he took occasion to tell a patron of mine that I had made a mistake in diagnosis, as had my case been one of hydatid cyst the patient would have died.

We had an endemic of cerebrospinal meningitis. I had two cases, there were eleven in all. All cases died save three. Of my two cases, one had very marked cerebral complications, with pronounced delirium and a temperature of 106.5. In the other there was pulmonary congestion and acute Bright's. Both were very ill. Both recovered. The same medical friend gave out his opinion that I had made a mistake in diagnosis because they recovered. I sent him word that I had never yet been dependent upon a post mortem for a diagnosis, and I am sure that no one with any extensive experience in malignancy could really doubt the diagnosis in the case under discussion.



RADIUM, ITS EMANATION AND THE EMPLOYMENT OF BOTH FOR HEALING PURPOSES WITH SPECIAL ATTENTION TO THE EMANATION CATAPHORESIS IN THE ELECTRIC FOUR CELL BATH (DR. SCHNEE'S SYSTEM).

BY T. E. GURTNER, M.D., NEWARK, N. J.

Soon after the discovery of the x-rays by Roentgen, scientists began to examine all kinds of substances as to their relation to rays. One of the first to interest himself in this subject was Becquerel, who made a special study of fluorescent substances, because he assumed that there was some relation between fluorescence and invisible rays. He believed himself justified in this assumption, because the negative rays were known to produce fluorescence. In the course of his experiments, he also examined the uranium salts, and found that they gave out permanent invisible rays. The presence of these rays was shown by a photographic plate, which was blackened in various spots by these salts. This discovery resulted in the testing of different metals for their radioactivity.

All metallic ores were systematically examined for this property by Mr. and Mrs. Curie. Among them was pitchblend, an ore found in St. Joachimsthal, Bohemia, in Alaska and in German possessions in East Africa. The deposits left after the separation of uranium from the pitchblend were also examined, and it was found that these deposits, despite their close relation to uranium, possessed an even greater radioactivity than the uranium itself. This gave rise to the hypothesis that the greater amount of radioactivity belongs, not to the uranium, but to the residue most diligent. Effort was now made to obtain these radioactive products by means of a very tedious process—the so-called fractional crystallization. Through these means the Curies discovered polonium.

In the residue they found a material of a million times stronger radioactivity than uranium—radium. Radium, whose atomic weight was permanently placed at 226, seemed at first to be a peculiar substance which completely overthrew fundamental principles in the field of chemistry. This gave incentive for thorough examination of radium.

It was discovered that substances containing radium that glowed in the dark were fluorescent substances, and that other

fluorescent matter will glow in the presence of radium. One could almost believe it possible to make the blind see with this property, because if radium is put on the closed eyelids, those whose optic nerves are still normal, will see light. Graf, however, claimed that this was due entirely to the fluorescent reaction of the fluids of the eye.

As a result of continuous disintegration, radium is always from 3° to 5° C. warmer than the surrounding atmosphere. Radium changes oxygen into ozone, white phosphorus into a non-poisonous red phosphorus. Litmus paper is reddened exactly as in the case of acids, and the photographic plate is affected. Radium sends out constant corpuscular and non-corpuscular rays—the latter being conditioned by ether vibrations.

These rays were tested especially in the field of electromagnetics and by means of their absorption power. Three types of radium rays were found, the A (alpha) B (beta) and G (gamma) rays.

Sir William Crookes devised an apparatus, the spinthariscopes, which served to show the corpuscular existence of the a-rays. The zincsulphide umbrella is made luminous by the liberation of the alpha particle. The a-rays of radium are the ones which color glass black. This black disappears again by the application of heat. The power of coloring substances possessed by the a-rays is also interesting in other respects. Among the precious jewels, white sapphires and diamonds are colored blue. The rapidity of crystallization possessed by some substances is accelerated by the a-rays. The a-rays compose the largest part of the rays given out by radium. They are positively charged and their penetrating power is small. They are only slightly diverted by the magnet, and they ionize the air very strongly.

On the other hand, the b-rays, which compose only a small part of the combined rays of radium, are strongly diverted by the magnet, are negatively charged and possess a hundred times the penetrating power of the a-rays.

Finally, the g-rays are non-corpuscular, have an extraordinary penetrating power, are not influenced by the magnet, and are very similar to hard x-rays—but the g-ray at short range has a penetrating power one million times greater.

Besides these three types of rays, radium also constantly

gives out a gaseous product, the emanation, which shows characteristics of the inert gases. Its atomic weight is 200. It can be blown away by a current of air, is mixable with other gases but not soluble, spreads itself evenly, diffuses through porous materials, and can be liquefied by vigorous refrigeration and the simultaneous application of heavy pressure. The emanation is luminous in the dark and is inactive to chemical reactions just like the inert gases, helium, argon, etc. It causes substances to fluoresce in its vicinity and it is constantly disintegrating. That which we describe as the product of the emanation, is the result of the disintegrated products of radium by way of the emanation. The emanation disintegrates through the giving off of a-rays, which rays transform into helium, a new element. This is the first known example of the transformation of one element into another which we have had. This transformation is called transmutation, and was anticipated and foretold by Faraday in 1818.

Wherever there is emanation we find also, as a remote product, radioactive precipitate. For instance, if one puts emanation in a vessel, a radioactive precipitate settles on the sides which, as stated, is a disintegrated product of emanation. Consequently, if one wants to use such vessels for analysis, this radioactive precipitate must be gotten rid of. This can be done by rubbing it off or by adding certain acids which dissolve the radioactive precipitate. This emanation is odorless, tasteless and invisible, and its presence can be detected by means of the electroscope.

Now, imagine that all the tiniest molecules are charged with the tiniest particles of electricity. Such small particles are called electrons, and are charged either positively or negatively. Such electrons are generally bound together as so-called neutral electron combinations. Should the positive electrons predominate in a combination of electrons, they will seek to combine themselves with the negative electrons.

The radium emanation possesses the power of influencing the neutral electron-combinations in the air so that positive and negative electrons are procured from them. The air becomes ionized. This ionization of the air is stronger in proportion to the amount of emanation present (but saturation may be satisfied).

Now, if one brings a radioactive preparation into the vicinity of a charged electroscope, the little leaves will collapse because the air becomes ionized and, moreover, the stronger the radioactive preparation is, the more rapidly ionization takes place. Therefore, the rapidity with which the leaves collapse is a measure of the intensity of the radioactive preparation. The photographic plate and fluorescence determine quite well the strength of a radioactive substance.

Radium, as mentioned several times, is constantly in a state of disintegration.

The products in their proper order are: Uran-Ionium, Radium, Emanation, Radium A, B, C, D, Polonium lead.

Each of these products of radium possess entirely different life periods. For instance, whereas Radium A-B-C are only active for a few minutes, half of Radium D disintegrates only after 40 years, and therefore has, as we might say, a half-value period of 40 years.

The half period of radium itself lasts, in spite of its constant disintegration, for 1,300 years. Even the transmutation from uranium to radium can be proved experimentally. As to the transmutation from radium into lead, we have the fact that polonium in the uranium mines occurs with the same biological age in the exactly corresponding environment.

Thorium and actinium also give out rays and emanation. Thorium partly disintegrates after five years and adapts itself to irradiation exactly like radium.

The majority of wells and springs are radioactive. Radioactivity is also found in cellars and caves. In fact, the air is radioactive, and even more so over the ocean than over the continent, since through the constant changing of the water layers the emanation comes to the top and into the air. On the land, the radioactivity is controlled by the position of the moon and of the barometer. Rain and snow are also radioactive. On the contrary, larva is only slightly radioactive, because radium seems to lose power when it comes in contact with earthy substances.

Polonium, also radioactive, has no emanation, and its activity is due only to the alpha particle.

THE PHYSIOLOGICAL PROPERTIES OF RADIUM RAYS AND OF EMANATION MUST BE KEPT STRICTLY SEPARATE.

The first tests made with radium on a hen's egg showed that the shell became black, the white of the egg had a greater consistence and the yolk became harder—the yolk turned green and had a peculiar odor of trimethylamin.

Aschinasz and Kaspari discovered that cholera and typhus germs are killed by radium rays, and anthrax germs are destroyed, as shown by Pfeifer and Friedberger.

Ferments also are influenced in a far-reaching manner. Emulsin is destroyed. Pepsin and pepsine as well as diphtheria toxin are not influenced and the strength of trypsin is increased. Radium increases cell division and modifies the growth of lower forms of life.

Long radium rays kill plants and herbs. Applied to the skin of a human being ulceration sets in. In order hyperemia, infiltration and necrosis of the skin set in. In healing, the necrotic tissues are replaced by connective tissue. Hair falls out, because the hair follicles are wasted away. The testicles become impotent under the influence of radium rays and in the ovaries the ovarian follicles die out. The blood-vessels become dilated, intima and media swell up and the blood pressure is raised.

The radium rays have an elective effect on sick tissues. Thus the carcinoma tissues possess a greater absorbing power for radium rays than normal tissues. Perhaps it is right here that the influence of the blood-vessels plays an important part as well.

The internal organs do not react specifically to radium rays. In the spleen it results in necrosis of the malpighian corpuscles. Parenchymatous tissues can never be replaced by radium rays.

The wide experience of Wichmann made it possible to use radium rays successfully in the treatment of lupus with the best results, when, for cosmetic or technical reasons, removing the diseased tissues from the healthy is not possible by any other means.

Besides several other skin diseases, severe tumors can be treated successfully with radium rays or injections of the emanation. In such cases a good penetrating effect is attained by means of the filter method. Appolant, Czerny, Caan and Arndt have attained real improvement by this method, particularly in cancer.

(To be continued.)

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M.D.

Uterine Hemorrhage and Its Treatment. Dr. Francis A. Harper (*Medical Conical*, May, 1913) has a paper on this subject in which great stress is properly laid on the constant current as the most valuable therapeutic agent, though it was unfortunate that the editor of the publishing journal had to add the proper dosage, "20 to 40 milliamperes, actually measured," to the phraseology of the paper, which contained no mention of dosage otherwise. This omission suggests the cautionary statement here that no physician is justified in applying a constant or galvanic current with one or both poles within the body without the use of a meter, except in an emergency. The reason is evident when we consider the electrolytic erosion that may attend an unnecessarily strong current in a situation like the upper vagina, or particularly the uterine cavity, where the parts are unusually insensitive.

The paper very properly indicates the positive pole as the proper pole for internal application, according to facts well known since the days of Apostoli, but does not discriminate between the unerring indications for the constant current in chronic hemorrhagic conditions of the uterus and an acute hemorrhage following an abortion, an instance of which is given. Effective control resulted from an application of "the galvanic current, placing the positive electrode within the vagina and well up against the cervix, and the negative plate at the nape of the neck." This was followed by a single packing of the vagina and prompt arrest of the hemorrhage.

The point I wish to make is that in acute hemorrhages after abortion a simple faradic current applied in a similar manner is usually effective. The uterine tissue will then respond to powerful primary induction currents, or the sinusoidal current possibly even better, and that one does not need to use the galvanic current in the great majority of cases, and does not need at this time to insert an electrode into the uterus.

It is when a more chronic hemorrhagic condition is present, either from retained shreds of an old abortion, from vegetations of the endometrium, from simple endometritis, or from unknown hemorrhagic tendencies, that the galvanic current is imperative; and here the addition of mercury ions, or copper mercury ions, from amalgamated electrodes of copper,

adds greatly to the value of the 20 to 40 milliamperes doses. The duration may be from 4 to 10 minutes, applied from one to three times a week.

G. B. M.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M.D., DENVER, COLO.

Case of Exophthalmic Goitre Cured by X-ray. (Sinclair-Tousey, M.D. *N. Y. Med. Record*, May 10, 1913.)

This is an interesting report, made seven years after the treatment. The patient, Mrs. W. S. B., was accompanied to my office by Dr. I. N. Love on September 14, 1905. She was 32 years old, weighed 116 pounds and had a blood pressure of 40 mm., and pulse of 130. There was moderate exophthalmos; Graef's symptom was marked, the upper lid not following the motion of the eyeball when she looked down. There was such palpitation of the heart that it shook the whole bed and kept her husband awake nights, and tremor of the fingers to such an extent that she could not pour out a cup of tea.

The treatment consisted of the application of the x-ray and high frequency currents from a vacuum electrode over the thyroid gland. The applications were made three times a week for three months. Arsenic and strychnine were given as the only medicine, and were only used for a short time. She returned then to her home in the south a well woman, with the request that Dr. Burbank, her attending physician, should watch the pulse and other symptoms and send her for additional treatment if required. Within a year she was subject to great anxiety on account of the illness of her little girl, but there was no recurrence of the disease.

She makes a trip to New York every winter for examination, but each time she has been found absolutely normal. The last time that I had an opportunity to show her was at a demonstration of x-ray dosage before the Congress of Clinical Surgeons of North America.

Massive Dose X-ray Treatment of Cutaneous Epithelioma.

(George M. McKee, M.D., and John Remer, M.D., *N. Y. Med. Jour.*, March 29, 1913.)

The two methods of x-ray dosage are gone into very thoroughly—the fractional and the massive methods. It is pointed out that in America the fractional has been decidedly most popular, while in Europe the massive dose has superseded.

the former entirely in the treatment of all superficial epitheliomas and rodent ulcers, etc. American radiologists, he thinks, not only prefer the fractional dose, but really antagonize the direct measurement of the rays, both in quality and quantity. He gives for the benefit of the present novices a vivid description of the indirect method of measurements of the majority of the old radiologists at the present day. The direct method of measurement consists of utilizing many of the factors of the indirect method with the addition of employing instruments designed for the purpose of directly estimating the quality and quantity of the ray. There have been many types of apparatus and many schemes advanced with this object in view. There are, for instance, the Holzknecht chromoradiometer and radiometer, the Sabouraud-Noire's radiometer, the Bordier chromoradiometer, the Bordier-Gilamard units and many others. They believe that the Holzknecht radiometer, with his modified technique, is the best technique of measurements at the present time. This idea of estimating the quantity of ray is based upon the change of color in a tablet of platinocyanide of barium which has been exposed to the ray. A standard color scale is utilized for comparison. The color scale is estimated in Holzknecht (H) units. The unit I- H- is one-third of that quantity of ray that will induce a mild erythema on the face of an adult man. The dose varies with the age of the individual and the part of the body exposed. Skin that has been exposed to the effect of irritating chemicals will respond more quickly than normal skin. Lesions of certain diseases are more sensitive than normal skin. Fair skin is slightly more susceptible than dark skin.

Many instruments have been designed for the purpose of judging the penetration or quality of the ray. Most notably the Benoist radiochronometer, the Benoist-Walter, the Weynelt, and the Walter scales. The authors have found the Benoist radiochronometer the most satisfactory instrument for this purpose.

What are the advantages of the massive dose method over the fractional dosage?

1. In the first place, the accurate measurements of the dose are hardly ever attempted except in intensive treatment, so that the methods can be said to be accurate and scientific.

2. The patient is spared the necessity of unlimited visits to the physician's offices.

3. Here the doctor describes the dangers, difficulties, failures and trials of the early radiologist in the indirect way of treating and estimating dosage in treating epithelioma, also how results improved as the worker nearer and nearer approached the massive dose and technique. He calls attention also to the value of the filter in the use of long-continued raying. He also calls attention to the fact that inefficient in-

direct dosing may cause an increase of the malignancy of an epithelioma. He calls attention to the fact that epitheliomas have developed on the various forms of lupus after inefficient raying. He calls especial attention to the case in which the hands had been burned years before and were in bad shape from fractional dosage of x-rays. One hand was exposed to a massive dose of x-ray and relieved nicely, while the unexposed hand remained the same. He calls attention to one American authority who claimed out of the 35 selected cases of epithelioma of the lower lip he had had failures of only two cases after an average lapse of six years. We have been able to prove to our own satisfaction the only way to cure a cutaneous cancer with the minimum amount of ray is to obtain the result with one treatment. If, for instance, six H units of a number 6 or 7 Benoist ray, administered at one sitting, will cure a case, the same effect will not be noted if this dose is divided into more than one sitting. Let us assume that only 5 H units were given in one, or the first treatment. It is a definite rule to allow three weeks to elapse between treatments. Now, at the end of this time the additional 1 or 2 H units will not effect a cure, and it will be necessary to give practically a full dose of 6 H units again. If the dose is divided the quantity must be increased. Therefore in the fractional dose much more rays are required than in one massive dose, and thus there is more danger of atrophy, telangiectasis, etc., as has been proven in the treatment of tinea tonsurans, where permanent alopecia was produced instead of temporarily.

Although the histopathology of acute and chronic radio-dermatitis has been studied, the biological effect of the x-ray is not well understood. The Roentgen ray modifies some cutaneous affections apparently by its ability to cause atrophy of the secreting cells. Other diseases are influenced by the effect of the ray on the blood vessels. There is evidence also, in some affections, that an opsonin or chemical antibody is produced. Is it not possible that by frequent mild applications the tissues are over-stimulated, or are taught to resist the beneficial influence of the ray? These, obviously, are questions that must be investigated before it can be definitely ascertained why the massive dose method is superior to the fractional dose method. They report in detail eight cases of lupus and epithelioma, all typical cases, which responded in a splendid manner to the massive dosage treatment. Each and every one was cured by one treatment, except one in which the tube was hard and the ray not sufficient, which had to have two exposures. The average dose was either 6 or 7 H units-B 6 ray, producing an erythema on the eighth day, which is an important test of the efficiency of the dose.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D., LOUISVILLE, KY.

Infection of Swimming Pools. (By Drs. Clark and Gage, *Bulletin Mass. State Board Health*, Sept. 6, 1913.)

Most modern swimming pools have provisions which aim to prevent the contamination of the water. At many of the swimming-pools, the walks are so constructed that any water splashed on them drains away from the pool; expectoration in the pool is prohibited and nude bathing for men is the general rule. At many places each bather is required to take a preliminary bath before entering the water, but unless a conscientious attendant is constantly on duty this preliminary bath may be very superficial with many of the bathers. Medical examination of the persons using the pool is required in some cases, but such examinations are usually made at such infrequent intervals as to provide only a small measure of safety from infection. Of the thirty-five swimming-pools reported by Mannheimer, at only twenty-three medical examination was made before a person was permitted to use the pool, and with very few exceptions, no subsequent medical examination was made. At only eleven of these pools was there any inspection of those entering, and at only one was every one required to pass through the shower-room on the way to the pool.

Modern Actions of Salt as a Purgative. (By Best, *Medizinische Klinik*, Berlin, July 27, 1913, IX., Number 30.)

It is interesting to notice, that the use of all kinds of physical methods and especially hydrotherapy is spreading in the medical profession. This is a consummation "devotedly to be wished." From the standpoint of the reviewer, it would certainly indicate an increase of interest and attention that is bound to be productive of much good in the future. Best reviews his experience and experiments upon dogs, upon whom he has produced Pawlow Fistula. The results also show, he says, that physiologic salt solution passes through the gastro-intestinal tract without irritating it or interfering with osmotic conditions, while there is nothing he knows of which is passed along so rapidly. His clinical experience confirms these experimental findings. He had patients drink two glassfuls of a 0.9 per cent. solution of sodium chlorid, twenty minutes before breakfast. After nine or twelve minutes defecation followed. The stomach expels the salt solutions remarkably promptly, setting up peristalsis throughout the intestinal tract. In the dogs 1 liter of the salt solution passed entirely through the alimentary tract and was expelled in thirty minutes, unless the animal was thirsty; in this case part of the fluid was absorbed. The larger the

amount ingested the more rapid the passage. Most mineral waters are hypertonic and are absorbed in the duodenum unless large quantities are taken. The accumulation of the fluid in the lower bowel has a purgative influence and this is supplemented by the peristalsis reflex emanating from the stomach. After drinking the salt solution on an empty stomach in the morning, he has the patient follow it with a cup of coffee or other appetizing drink. With atony of the stomach, the rapid expulsion of the physiologic salt solution makes it the only regulator of the bowels to use, he declares.

Sweating Procedures in Internal medicine. (By A. Schwenkenbecher, *Medizinische Klinik*, Berlin, July 27, 1913, IX., Number 30.)

After a preliminary review of the action of sweating procedures in internal medicine the author concludes his remarks on this subject with the statement that the systematic use of hot water baths may prove a great help in various diseases. The baths can be modified as to the amount of water, the temperature and the duration of the bath so as to adapt them to a delicate constitution and a weakened circulatory system. In kidney diseases the sweating procedure diverts the fluid from the edema to the skin, and thus benefits, but the assumption that large amounts of nitrogen and chlorids can be eliminated in the sweat is not justified by the facts. Although a little more is thus eliminated in the sweat of nephritics than of healthy persons, yet the total is comparatively small. Even an energetic sweating bath cannot wash out more than 1 gm. of nitrogen and 2gm. of sodium chlorid in this way, and in the individual case the question must be thoroughly studied whether this compensates for the demands made on the system by the sweating procedure. Hot local baths, hot baths for the feet or hot packs for the trunk in case of uremic headache and nausea, often have a marked influence on the symptoms of nephritis. But even with these it is of the utmost importance as with all sweating procedures, to see that enough fluid is ingested or supplied in some way to take the place of that lost in the sweat. It may be wise also to place a cooling appliance on the heart. He says that bacteria can pass from the blood into the sweat, but that this occurs extremely rarely. He thinks that in syphilis sweating procedures are not applied as often as they should be for the tertiary, torpid syphilids of the skin and mucous membranes, and torpid bone lesions. Baths facilitate the mercurial inunctions. On the other hand, he warns emphatically against sweating procedures in syphilitic nervous affections, as they are liable to aggravate them. He remarks that in applying heat or hot baths in treatment of chronic arthritis the intensity of the heat applied is an important

factor in the results; the action is more rapid and more intense the hotter the bath. Baelz has called attention to the fact that certain thermal springs with a temperature of 54 C. are the most effectual of all in Japan in the treatment of chronic joint disease.

HIGH FREQUENCY CURRENTS.

EDITED BY FREDERIC DEKRAFT, M.D.

Differential Diagnosis Between Abnormal High Blood Pressure of Functional or Organic Origin is worked out by Martinet in an article on "Les deux hypertensions" in *Presse Medicale* of Paris, for November 30, 1913, that was summarized in the *Journal of the American Medical Association* for January 18 last.

He emphasizes the importance of differentiation as the treatment for one may do harm in the other. The index to the functional form is obtained by comparing the diuresis with the range between the maximal and minimal pressure; that is, the differential pressure; the index to the organic form is obtained by comparing the viscosity of the blood and the differential pressure. He has found that, with normal kidneys the daily output of urine per c.c. of differential pressure is 0.25 liter or above. With sclerosis of the kidneys, the figure is below 0.20 liter. He gives some diagrams and tables to show the working of this law and its explanation. A syringe filled with camphorated oil requires more force to empty it than if it were filled with water, and in the same way the viscosity of the blood influences the output of the urine. On the other hand, if the syringe is fitted with a finer needle, still greater force is required to empty it, even when it is filled with pure water. An organic lesion of the kidneys interferes in the same way with the output of urine. In a dozen patients with normal or merely functionally high blood pressure the differential pressure ranged from 6 to 12, the viscosity from 4 to 6.2. The index is obtained by dividing the differential pressure by the viscosity. In health or without kidney disease the result is an index ranging from 1.2 to 1.8. In twelve patients with interstitial nephritis the differential pressure ranged from 10 to 22 while the viscosity was low, 3.2 to 4.7 at most, and the index ranged from 2.55 to 7.3. When results such as the above are found on repeated examinations, light is thrown on the true condition, possibly in time to ward off irreparable damage.

Two cases of Roentgen ray burns are described by E. Pagenstecher in the *Beiträge zur klinischen Chirurgie of Tübingen* for December last. One of these is illustrated, was located

on the abdomen, very painful, 10 x 6 cm. in area five months after its first appearance. At the operation the defective tissue was removed down to and including the fascia, so as to reach normal structures. Thiersch flaps were then used to cover raw surfaces and union followed after three months. All pain disappeared with the operation.

PHOTOTHERAPY AND DERMATOLOGY

EDITED BY HERBERT F. PITCHER, M.D.

The Abiotic Power of Ultra-Violet Rays. (By Chanoz, *La Tribune Medicale*, July, 1913.

"By abiotic power is meant the power possessed by the spectral rays of preventing the growth of and destroying the life of micro-organisms.

"The attention of the layman to this large subject is due to the attempts of Courmont and Nogier to sterilize municipal watersheds by means of radiations from the mercury vapor lamp invented by Heraeus in 1904.

"The knowledge of the bactericidal action of spectral radiations dates from 1877, and in the next two decades several investigators were engaged in the study of the action of sun rays, the radiations of the electric arc light, etc. In the period from 1899 to 1905 Finsen and his pupils studied various sources of light rays; carbon, calcium, cadmium, zinc, iron, mercury, aluminum and the sun rays, and, especially, the action of the different spectral regions on the microbes, yeasts, fungi, ameba, infusoria and animal tissue. It was found that yeasts are destroyed by light rays with greater difficulty than micro-organisms; that among the different species of micro-organisms the susceptibility varies greatly, and that among organisms of the same species the young ones are more resistant. The colloids were found to protect the organisms by absorbing the rays. Delicate bolometric instruments were devised for measuring the abiotic power of rays of varying length. Radiations of a wave length below 0.280 possess a considerable abiotic power despite the small amount of energy which they emit.

"The next most important step was the discovery of a method of melting quartz, of modeling it and of making transparent quartz globes for the light. These are superior to glass in that they transmit the invisible ultra-violet rays whose wave length is below 0.29.

"The best example is the Heraeus mercury vapor lamp of quartz, which has a very high abiotic power because of the short ultra-violet rays, and promises great results for industry as well as for therapeutics and hygiene. As early as 1905

attempts were made to sterilize milk by means of this lamp, and in 1909 Courmont and Nogier sterilized water by placing the lamp in the water.

The Silica-Westinghouse lamp gives similar results, but has the disadvantage of lowering the temperature of the lamp and, consequently, reduces the emission of rays, and further, a progressive diminution of the radiation due to absorption of rays by the deposit on the quartz of the particles suspended in the water.

"Victor Henri and his collaborators draw the following conclusions from their tests with the mercury vapor lamps: The transmission of ultra-violet rays increase with the voltage of the current. The intensity of the ultra-violet rays of a wave length below 0.302 increases more rapidly than the intensity of the visible rays transmitted at the same time. A voltage of 200 volts produces in the quartz lamp an irradiation of violet-rays that is far superior to the irradiation produced by the same voltage with the Finsen carbon lamp, even when the latter is reinforced with quartz. The bactericidal action is independent of the temperature of the medium in which the organisms are contained; it is therefore not of caloric origin. Nor is it due to the presence of oxygen formed by the action of the ultra-violet rays on the water. The abiotic action varies inversely with the length of the wave. It is proportional to the coefficient of absorption of the protoplasm of the individual under treatment.

"The sensibility of micro-organisms to ultra-violet rays is not influenced by their length, pigmentation or resistance to heat. The following table shows the relative time of exposure required to kill forms at a distance of 20 cm. from the lamp of 110 volts:

| | |
|-----------------------------|------------|
| Staphylococcus aureus | 10 seconds |
| Cholera bacillus | 11 seconds |
| Typhoid | 18 seconds |
| Dysenteric | 19 seconds |
| Colon..... | 19 seconds |
| Pneumococcus | 22 seconds |
| Tetanus | 40 seconds |
| Sarcinus | 50 seconds |

"Fungi required an exposure of 300 seconds, and aspergillus is only killed after fifteen to thirty minutes.

"The abiotic action of ultra-violet rays is probably due to physio-chemical changes produced in the protoplasm, as a result of the energy absorbed. Microscopic examination after irradiation shows structural changes, first coagulation, then beginning disintegration (phenomenon of Pfeffer) and finally true bacteriolysis, and the staining properties are also modified, *e. g.*, the acidfast organisms lose that quality after irradiation."

FRENCH ABSTRACTS.

EDITED BY EDEN V. DELPHY, M. D., NEW YORK.

Some Considerations upon Radiotherapy of Uterine Fibromyomata. By M. Jaugeas, of Paris. (*Archives d'Electricité Médicale*, August 25, 1913)

Under a new form radiotherapy has again taken up castration, which has been applied with so much success in the treatment of the uterine hemorrhages of fibromyomata, and it has been justified by the clinical considerations and the relations which have been established histologically between the ovarian lesions and the uterine symptoms. But it is not a simple re-edition of surgical castration, because its atrophic action upon the ovary is completed in certain cases by its destructive action upon the myomata, as we have clearly observed in two cases. The technical indications of our method of treatment are as follows: Rays, 7-8 B, filtered through 1 millimeter of aluminum; dose received by the skin, 5 H., each seance repeated every fifteen days; irradiations applied to each ovarian region of the sector of the abdominal parietes corresponding to the fibroma. In our thirty-one cases it resulted in the menopause appearing after four or five seances in the patient who had attained or passed forty years, and in seven or eight seances in those whose age was less than forty years.

Treatment of Hypertrophy of the Prostate by Radiotherapy.

By M. Haret. (*Archives d'Electricité Médicale*, August 25, 1913.)

The author first considers the cases in which radiotherapy ought to produce a good effect, and reports some of the observations which confirm his presumptions. He believes the best result is obtained in cases of glandular hypertrophy. By simple irradiation through the perineum, he obtained a great amelioration in the troubles of micturition—diminution of both diurnal and nocturnal frequency; after about ten seances the patient had to arise only once or twice during the night for that purpose. On continuing the treatment it led to a diminution, sometimes considerable, in the size of the prostate, from the size of an orange to that of a half mandarin in one case.

Radiotherapy, Profound, in Gynaecology, Treatment of Myomata. By Albers-Schonberg. Report of the Committee of the Fourth International Congress of Physiotherapy

at Berlin, March 29 and 30, 1913. (*Archives d'Electricité Médicale*, April 10, 1913.)

The author states that the fundamental principle of his technique of irradiation is to apply only the quantity of rays necessary to obtain a successful result. He does not consider the length of the seance except with this purpose in view. He has already published a table in the *Fortschritte a. d. Gebiete der Röntgenstrahlen*, Band XIX., Heft 5, p. 326, in which he showed how he determined the dosage, and what ought to be the minimum dosage necessary (between 17 X and 390 X) to obtain a complete cure in forty-three cases. Moreover, this table shows the relation between the quantity of the rays applied, the duration of the treatment, and the age of the patient. At first he recommended the practice of irradiating by only port of entry, that is by having the rays applied perpendicularly to the abdominal wall and affecting with one stroke all the genital organs. Later he applied the rays by two ports of entry, in causing the rays to penetrate the parts in a lateral oblique direction, the patient being in the dorsal or lateral position. This was done in order to spare the skin. But by this method it is not certain that the ovaries and the myomata are reached by the rays because of the variability of their situation. If the rays do not strike the ovaries and myomata, then all the work is in vain, while the neighboring organs may be injured by the irradiations. On account of this incertitude, he returned to his former method of irradiation—by a single port of entry and according to former technique in their application. In order to accelerate the treatment, he irradiated with two tubes functioning at the same time, the one above and the other below the patient. The apparatus he employed was a special one made for him for the purpose. At the beginning he used a filter of tinned or coppered paper, later he also employed filters of aluminum 2 millimeters thick. In his opinion, the rays thus filtered and applied with moderation are not able to cause any lesion of the internal organs of the body. At first the irradiations were limited to three seances of six minutes duration each; recently he has augmented their time and number, and now he employs four seances of eight minutes each. He thinks this is sufficient, and the treatment cannot be extended to advantage. Before declaring the innocuity of the treatment, it will be necessary to wait until we have several years' further experience. As an example of this he refers to a late lesion which he had the misfortune to observe in a confrere. This confrere had employed the x-rays for the last time twelve years ago without having acquired any lesion, except slight alteration of the finger nails. Now, twelve years later and without having employed the rays again, one of the nails having a healthy appearance is split. This phenomenon can

be explained only on the ground that an interference with the matrix of the nail developed very slowly. In conclusion the author warns against thinking that the "Roentgen dizziness" is as insignificant as alcoholic dizziness. The condition of "Roentgen dizziness" is very grave, and depends upon alterations in the blood, and that is always a serious matter.

Experiments upon Nutrition by Aid of Heat. By Miramond de Laroquette. (*Archives d'Electricité Médicale*, April 25, 1913.)

The author measured the rations submitted to conies subjected to different temperatures and to different atmospheric conditions. He was able to prove that the needed ration decreased as the temperature augmented, the weight of the conies being stationary or slightly increased.

Radiography of the Foetus in Utero, Indications, Technique. By Potocki, Delherme and Laquerriere. (*Archives d'Electricité Médicale*, April 25, 1913.)

Radiography of the foetus in utero has become possible only lately, that is to say, only since the late perfections have been obtained in instrumentation and technique, and especially since the employment of a tube permitting the passage of 30 to 40 milliamperes of current and an exposure of only two-fifths to three-fifths of a second. After having had a purgation and an enema, the woman lies upon the back, the loins resting upon a thin support which will arrest only an appreciable portion of the rays. The tube is under the table, the supporting frame, plate and reinforcing screen upon the abdomen, maintained in place by two lateral compressors which compress slightly. The rays are caused to fall perpendicularly upon the center of the plate, and an image of the foetus is obtained in its totality, which is an evidence of its situation and its development. In order to obtain a good radiograph, it is necessary that the woman should neither move nor take a breath, that the uterus should not contract nor the foetus stir. The authors join to their communication a beautiful series of very demonstrative radiographs, permitting the diagnosis of presentations of the vertex, the breach, and of twin pregnancies.

The Journal of **Advanced Therapeutics**

VOL. XXXI.

NOVEMBER, 1913.

No. 11

Edited by DR. WILLIAM BENHAM SNOW

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THE SIGNIFICANCE OF ABNORMALLY HIGH BLOOD PRESSURE IN CHILDREN AND YOUNG ADULTS.

It is generally conceded that auto-intoxication, arising from absorption of intestinal toxins, is the prolific cause of hypertension. This, together with an inactive liver, which in its normal condition destroys or converts into innocuous bodies 75 per cent. of the toxic poisons circulating in the blood, calls the physicians' attention to the recognition of both as important factors when hypertension is present. It has been observed in all cases presenting other evidences of auto-intoxication, such as cases of epilepsy, chorea, endocarditis or infectious arthritis in children, that hypertension is uniformly present and to a marked degree. When hypertension is present, therefore, without other manifestations, it should always suggest the possibility of pending intercurrent affections of the nature of those caused by auto-intoxication. In young adults, or even in those between the ages of 30 or 40 years, the presence of hypertension as evidence of auto-intoxication, is always an indication for the correction of the habits of diet and intestinal regulation, otherwise the natural consequences must follow. It is the sign for the institution of a dietetic and general hygienic regime looking to the elimination as far as possible and the prevention of formation of poisons in the alimentary tract. If the arterial tension is watched and the causes corrected, the precaution thus taken throughout the life of the

individual will ward off the otherwise progressive development of hypertension and its consequences—arterio-sclerosis and Bright's disease, as well as other inter-current conditions arising from auto-toxemia.

As suggested above, it must be recognized that restoration of the liver function is of the greatest importance in the management of these cases, for if a liver is defective in its function, and for that reason the toxemia is ravaging the body, it is evident the institution of its normal organic function is of the utmost importance. This may be readily accomplished by the application of the static wave current applied with a large metal electrode over the liver, by the direct d'Arsonval current passed through the liver, or possibly by the employment of the sinusoidal current with a large electrode over the back and on the level of the second dorsal vertebra, and another of the same size anteriorly from the level of the upper border of the liver over the abdomen.

The diet in these cases should always be low in proteins, and well masticated. In addition the pressure should be reduced to normal by mechanical vibration or the auto-condensation method, when it will remain so if the regulation of diet and daily evacuations are properly maintained.

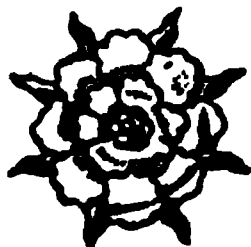
RADIUM IN MEDICINE AND SURGERY.

The movement instituted in this country looking to the establishment of facilities for the production of radium from our rich American sources of this new mineral, together with the discussion and the reports of its reputed wonderful properties in the treatment of various affections, as of gout, hypertension and cancer, is arousing a remarkable interest in this new and more or less mysterious agent.

Those who are familiar with the uses of electricity for the relief of many of the conditions named are not so enthusiastic over some of the attributed uses of radium; because better results have already been obtained from the static and high frequency currents, mechanical vibration, light and the x-ray, than the most ardent claims made for radium have indicated. Better results are constantly obtained by those who are familiar

with the rational use of other physical agents in all functional diseases.

If the rank and file of the medical profession would investigate with more earnestness and thoroughness the physiological effects of the physical agents referred to, radium would not demand the same attention nor receive it as it does to-day. It is generally conceded that the only rays of radium of therapeutic value are the gamma rays, and they have an analogue in the x-ray.



DEFORMING ARTHRITIS AND INTESTINAL STASIS.*

BY A. B. HIRSH, M.D., PHILADELPHIA.

Are we facing a change in the supposedly established treatment of joint inflammation? This seems to be the query now presenting.

Physicians trained in physical treatment methods have with such full satisfaction relieved or cured chronic arthritis with enteric torpor that it comes rather as a surprise to learn that the intimate etiologic relation thought to exist between the two symptom groups is now being denied by some authorities. Their position seems to rest, so far as argument goes, on laboratory studies rather than on clinical results such as are being constantly achieved by our advanced methods.

At the 1912 session of the American Orthopedic Association Nathan¹ expressed his belief that connection of the joint and bowel conditions was not proved, among other reasons asserting the following:

(1) Cases of gastro-intestinal intoxication are reported in the literature, of known endogenous origin, in which "there are either no joint symptoms or these were of such slight or evanescent nature that they were either overlooked or disregarded. It is true, on the other hand, that there are innumerable case reports of toxic polyarthritis said to be due to auto-intoxication of gastro-intestinal origin, but in these, strange to say, the constitutional symptoms are conspicuous by their absense." The joint symptoms ranged from mild to severe even to ankylosis.

(2) He disputes the value of the indican test as being indicative of arthritis with colonic stasis, stating that indicanuria is found in many other conditions in which joint symptoms are absent. He claims that intestinal intoxication and indicanuria have not been shown to be connected with joint inflammations; that the protein putrefactive processes causing indicanuria take place in the small and not in the large intestines; that indicanuria depends not on simple constipation (the latter often being found in otherwise healthy persons), but on such conditions as interfere with propulsion of contents of the small intestine, as occlusion or peritonitis or *great* increase there of putrefactive processes.

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City, Sept. 2d, 3d and 4th, 1913.

(3) "In contrast to this, there are undoubted cases of auto-intoxication, due to intestinal putrefaction, having the definite clinical signs, which show absolutely no joint involvement."

He then attempts, in a seemingly logical way, quoting Senator's well-known classification of auto-intoxication, to point out the toxic element and clinical symptoms in some of the many (?) varieties of arthritis met in practice.

SENATOR'S CLASSIFICATION OF THE VARIOUS FORMS OF AUTO-INTOXICATION.

{Symptoms and organic changes caused by anomalies of the metabolism.)

A. Retention autointoxications.

CO₂ intoxication (combined with diminished O intake)
due to obstruction of the air passages.

B. Resorption intoxication.

1. Gastrointestinal (enterogenous).

Phenoluria (indicanuria) due to constipation, ileus, peritonitis.

Diacetonuria due to digestive disturbance and over-feeding with fats.

Hydrothyonemia.

Tetanie.

Pernicious anemia due to helminthiasis.

2. Resorption from the bladder.

Ammonemia.

Hydrothyonemia.

3. Resorption from other body cavities.

Indicanuria.

Hydrothyonuria.

Bone and joint disease from bronchiectasis.

A + B. Combined retention and resorption intoxication.

Icterus.

C. Dyscrasias or histogenic intoxication.

1. Acidosis.

2. Nucleolysis (uric acid).

3. Anomalies of the specific internal secretions.

Morbus basdowii, cachexia strumaprima, myxedema.

Diabetes after pancreas removal.

Addison's disease due to adrenal anomalies.

Acromegaly in relation to anomalies of the hypophysis.

A or *B* + *C*. Combined resorption or retention intoxication with dyscrasic intoxication.

Uremia from renal insufficiency.

Cholemia from hepatic insufficiency.

D. Intoxication from infectious disease.

Elliott² repudiates the diagnostic value of laboratory study of indican and ethereal sulphates in intestinal stasis, etc. He depends, at the Montefiore Home for Chronic Invalids in New York City, rather on careful skiagraphy of abdominal contents. Van Noorden,³ on the other hand, resorts to the x-ray plates only for corroborative evidence.

Positive as seem these views of Nathan and Elliott, they but add to the controversy (between orthopedists and internists, may we say?) now actively in progress, that proves how unsettled are the various hypotheses on the subject. The judgment of Elliott and Nathan as to the indicanuria test for intestinal stasis is seen to be at direct variance with that of van Noorden,³ who claims "first it should be noted that in the majority of these cases (of constipation from spasm of the sigmoid flexure) a quite unusual excretion of indican is found. While in normal cases, by means of the colorometric method of Bouma, we find about 20 mg. of indigo in the daily urine, this amount is increased in our cases (of sigmoid spasm) often to 50, 80 or even to 100 mg. This shows an abnormal degree of bacterial decomposition of albumen in the intestine and a relatively large absorption of the products of putrefaction."

Realizing, therefore, this antagonism of opinions, how far shall uranalysis help us in diagnosis and treatment of such cases? is the question we must ask ourselves, and the reply should be unequivocal: Until other, more dependable tests are found, conflicting views of authorities as to the diagnostic importance of urinary extractives in arthritis must make the physical therapist continue to depend on the presense of indicanuria and on the fractional proportion between the conjugate and preformed sulphates as guides to intestinal proteid putrefaction, both as the cause of the joint trouble and as indications for its treatment.

Another witness for our established methods is Daniel,⁴ a surgeon of standing, whose wide experience in London convinces him that chronic intestinal sepsis (that he terms "catarrh") is

a very prevalent cause of constipation. . . . In short, sepsis first leads to stasis. He is firm in his belief that the most potent factor in inducing all intestinal lesions commencing in the mucosa, and including constipation, is oral or nasal accessory sinus sepsis. To gastro-intestinal sepsis directly he attributes most osteoarthritis, while the varieties known as rheumatoid arthritis he considers are due to a combination of gastro-intestinal and genito-urinary sepsis . . . the treatment he adopts in general, especially in its bearing on arthritis. He believes that if . . . the origin of the infection in the mouth and elsewhere is cured, the stasis in the vast majority of cases will tend to cure spontaneously and, if appropriately aided, the patients entirely recover.

A cognate subject of interest to practical physiotherapists is the time and effort lately given to minute clinical subdivisions of forms of chronic infective arthritis by research students rightfully desirous of better results from old-time treatment. Few of the classifications thus offered are found to agree, much depending on the viewpoint of the individual investigator. Were these gentlemen to become fully aware of the success attained with such patients by members of this Association, much energy might, perhaps, be saved in attempting over refinement of diagnosis. Duckworth,⁵ indeed, scouts the possibility of differentiating even by radiography between rheumatoid and osteoarthritis. So experienced a clinician as Peter Daniel⁴ also insists on this difficulty, and both base their treatment accordingly. Those using physical treatment methods will coincide with this opinion, let me repeat, having for some years employed identical measures for both forms—this therapeutic test being confirmatory.

We thus find safety in numbers, and will hold to our simplified but effective classification until much more convincing evidence is offered in favor of these hypothetic subdivisions.

The intestinal toxic origin of some cases of arthritis being tentatively recognized, the question will sometimes come to us as to whether a bacteriologic study of the particular infection with use of its autogenous vaccine might not hasten its course. In other words, how about the possibility of specific germs in connection with such intestinal stasis and toxis? Schuller's bacillus is thought to be pathognomonic in rheumatoid arthritis by such an eminent authority as Morton,⁶ while

Crowe⁷ states that he has found his staphyloid coccus A in 19 out of 22 cases of rheumatoid arthritis. Was the connection casual? he asks. Of course, until more extensive studies are concluded, there can be no definite reply. The complement-fixation tests described by Hastings⁸ may solve the difficulty in diagnosis, and for those not trained in the procedures of Wm. Benham Snow,¹⁰ for treatment also.*

While upon these diagnostic phases of the subject I would like briefly to accentuate this matter of searching for primal causes. Even when gastroenteric stagnation coexists with arthritis, it is my rule carefully to search for additional possible sources of infection. Repeated questionings of members of the family and interviews with the family physician will sometimes reveal a long forgotten purulent otitis, sinusitis, bronchiectasis, puerperal sepsis, genitourinary infection or other focus, the mild symptoms of whose long continued course have made the patient place no importance upon or else actually forget about the likely connection. For certain patients the expert opinion of specialist colleagues is infrequently needed to clear up the diagnosis before successful treatment is possible.

It may be well at times, where spasm of the sigmoid or neoplastic bands or other obstruction is suspected, to follow van Noorden's suggestion,⁹ and depend upon skiagrams taken after a barium or bismuth meal. Here the ablest radiologist within reach is to be selected, as so much depends upon his expert interpretation of the plates.

Ignoring, then, until proved the proposals of research workers for multiplication of types of deforming arthritis with intestinal torpor and, also, realizing the futility of drug medication or surgery for its relief, those familiar with physical treatment methods hold that certain definite indications exist in successful removal of that joint affection. These include: (1) Profound tissue change about the involved joints, for removal of abnormal deposits and restoration of an ap-

* Snow has shown us in gonorrheal arthritis, for example, how thorough application of the static wave current, by means of the usual metal rectal electrode or the special electrode of Titus, will drive out the infective material from its focus, recesses in the prostate gland. The stream of infection ceasing, the joint symptoms the more readily disappear.

proximately normal circulation. (2) Removal of muscular spasm dealing with these joints. (3) Removal of the constipation underlying the systemic state that caused the joint changes with (4) renewal of daily normal bowel movements. (5) Artificial support of splanchnoptotic organs until (6) restoration of the abdominal musculature maintains correct position. (7) Suitable dietary, exercises and hygiene to hold the organism in a normal state.

To meet these indications static sparks are applied, by means of the director, alongside or between the enlarged joints while muscular spasm is similarly controlled by local sparks.

Constipation calls for a variety of modalities, according to the symptoms and temperament of the patient. Impacted feces must, first of all, be removed by daily high colonic flushing with water (or oil, to remain over night) until these packed masses no longer appear. Vibrassage of the first three lumbar intervertebral spaces, according to Arnold Snow,¹¹ or sinusoidization or concussion of the corresponding vertebral spines, by Abrams' method, will stimulate the circulatory intestinal muscular fibres, and thereby peristalsis, if the constipation is atonic. The eleventh dorsal vertebra, instead, is to be treated if constipation is spastic. Deep vibrassage over the three portions of the colon and over the liver also stimulates the intestinal musculature. The double spark gap current of Bishop, the electrodes applied over the abdomen and the lumbar spine, is especially effective for this object as, also, is the sinusoidal current with electrodes applied over the descending colon and epigastrium, or the static induced current with a large metal plate over the epigastrium and the metal rectal electrode in situ.

For improvement of general metabolism, of prime importance in these patients, the high power hooded incandescent lamp swung over the abdomen or application to this region of the d'Arsonval current from the high frequency coil, this followed by the static wave current, with the metallic electrode placed diagonally beneath the ribs; this course must continue daily until nutrition reaches a relative norm.

Application of the Rose or other efficient abdominal bandage will aid suitable exercises for redevelopment of relaxed muscles that permit of visceral descent. Elliott² correctly holds that splanchnoptosis may not be the primary cause of a

chronic arthritis . . . but the vicious circle set up by intra-abdominal descent must aggravate and make progressive the joint affection.

Careful study and regulation of the dietary to lessen intestinal fermentation and putrefaction is necessary, and here idiosyncrasy must be well considered. Barr's recent dictum⁹ on dieting in arthritis is most informing.

Where the affection lingers in one or several joints when the foregoing methods have cured it elsewhere, the lithium iodid ionization plan of Morton⁶ will occasionally prove successful.

This resumé would be incomplete, in view of the interest aroused abroad, were it to omit mention of the use of radium in deforming arthritis. The new knowledge that the waters of Saratoga and other great American spas are decidedly radium-bearing adds emphasis to the possibilities of the remedy. A great new field of therapy is thereby offered.¹²

We thus realize that the disease and its removal call for much patience and varied resources on the part of the practitioner, and that he acts wisely whose aim for the present is to hold to that which is proven.

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Discussion.

Dr. William Benham Snow, of New York: I had intended reading a paper on this subject, owing to the fact that I had some cases that I wished to present, and Dr. Hirsh has willingly consented to my exhibiting them now.

Case I is one of Still's disease, which was formerly called rheumatoid arthritis in children. It has since been demonstrated by Still that these cases are complicated by enlargement of the spleen. This young woman I have exhibited twice at the Academy of Medicine, once before the Orthopedic Section. She came under my observation at two and one-half years of age, in a helpless condition, referred to me by Dr. Royal Whitman. I do not think he had any serious notion that I would do her any good, but he had gotten wearied of the case and the mother's wailings. I at once began treatment with the static wave current applied to all the large joints. Every large joint, as well as the fingers and toes, were swollen and painful. The muscles of one hip were contracted, and the child was in a generally deplorable condition, after more than one year's treatment in the Hospital for Ruptured and Crippled. It is now ten years since she came under my observation, and she is, as you see, now free from all evidence of the trouble. I

treated her only for six weeks with the application of the static wave current to the joints under which she made rapid improvement from the outset. I made no application to the spleen with the wave current as I would now. After six weeks she disappeared quite suddenly, and I did not see her until the next winter, when Dr. Whitman had sent for her, not knowing of her improvement, in order that he might exhibit her with a number of other incurable joint conditions. That case received no attention whatever as far as diet was concerned. It was a case of wave current treatment and cure. The treatment was administered daily to each of the larger joints for twenty minutes, several joints being so connected as to be treated at one time.

Case II. This lady was a sufferer from rheumatoid arthritis for years. She was three years in Roosevelt Hospital, during which time one wrist became ankylosed. She had been on crutches eighteen months when she came to us, and the crutches were shortly laid aside, and she gradually improved, until now the only evidence of the trouble is the ankylosed wrist. Her knees and all her joints were affected when we took her under treatment. We have latterly paid more attention to the diet in these cases, because in a series of cases with fecal examinations made for me by Dr. Anthony Bassler he demonstrated the presence of intestinal putrefaction in every case, with various other flora. We now pay strict attention to details in all these cases, keeping up their elimination with light baths and static electricity and keeping them on a practically meat free diet. The affected joints are treated often with the wave current and sparks; the results in these cases are most gratifying.

Case III. I also have here Dr. McK., of Brooklyn. He was a patient of mine nine years ago. There was not a joint in his body that was not swollen and stiffened. For one month he did no riding, attending only to office practice. He came daily except Sundays to our offices, and another month came steadily, and less often for two more months. Static sparks, the static wave current, light, light baths, and mechanical vibration were systematically employed. No attention to diet. He was promptly cured, and has now been well nine years.

He came to me last fall with an acute sacro-iliac subluxation. He was so helpless that he required assistance to get in the house. With the wave current applied over the glutei muscles and adductors of the thigh, together with manipulation and exercise, in five treatments he was cured.

In all inflammatory joint affections one important thing is to relieve muscular spasm, particularly so in sacro-iliac affections. After the spasm is relieved it is easy to reduce the luxation; when it is kept relaxed for three or four days it is easy to promptly cure acute sacro-iliac luxations. This statement is based upon uniform results in more than ten cases.

There was no medication used in any of these cases.

Dr. Pfahler: I would like to ask whether these cases had been examined radiographically, what they showed, and also what your present treatment of chronic cases of osteo-arthritis is?

Dr. Snow: You mean rheumatoid arthritis. It is a clinical picture in itself. A case of rheumatoid arthritis presents a type of conditions absolutely different from other classes of cases of so-called arthritis deformans. The fusiform swelling of the fingers with absence of exostoses and so-called chalky deposits, enlargement of the joints, the bilateral condition with the involvement generally of a number of the joints with distortions and inter-articular erosions, particularly of the finger joints, whereas in the other cases involvement of the joints is less extensive and more localized. I have made skiagrams of a great many of these cases, and divide them into five classes: Still's disease is one; rheumatoid arthritis a second; and a third class of cases in which the bones of the digits are enlarged, as can be seen in the skiagraph. These are exostoses, not deposits. There is a fourth class in which the bones become slightly flexed latterly with erosions of the middle and end joints. I have seen three of these cases. One was published and described in one of my works. In a fifth class occurs actual calcifications. This last is the rarest of all conditions, as x-ray studies have demonstrated. In more than two hundred cases of arthritis deformans that we have observed, I have only seen these deposits in three cases.

As to the prognosis in rheumatoid arthritis, the second class referred to, I base it on the amount of destruction that has occurred when the case comes under observation. In a case of rheumatoid arthritis taken under observation before there is destruction in the joint of the inter-articular cartilages, it will show in the radiogram, the bone ends not coming together as they will when the intervening cartilage is destroyed. Such early cases are clinically curable, *i.e.*, it is possible to relieve their pain and suffering and restore them to a good physical condition, which with judicious diet and hygiene may be maintained. Dr. Arnold Snow was a sufferer from rheumatoid arthritis ten years ago. She has taken care of herself, and yet, from time to time, there will be some symptoms of aching in her joints.

Case IV. This gentleman, Mr. L., went the rounds of the profession, and was treated, among other things, with hydrotherapy for three months. Shortly after he had been so treated he came to me in a very bad condition. There were no joints in his body that were not painful and stiffened. He could not close his hands by two inches without the greatest suffering. He could not raise his arms. There was a general involvement—a typical case of rheumatoid arthritis. He has now

good use of all joints, can close his hands and use them as well as ever.

I take great pleasure in exhibiting these patients, as examples of a large number of these cases in which we have obtained similar results. I feel warranted in saying that any case of rheumatoid arthritis can be put in a clinically good condition, provided destruction has not taken place in the joint sufficiently to put them beyond the possibility of cure, and all but extreme cases in late stages can be benefited. Of course, there are cases which we cannot even relieve. The treatment of the local condition with the static wave current or static spark, either one or both is an important part of the treatment, though diet and attention to the alimentary canal are the basic part. In Dr. McK.'s case and the case of Still's disease and many others, static was either the only or principal treatment, and they have remained well. Two of the cases exhibited are now much better when restrained from a proteid diet, while the physician and case of Still's disease have never been restrained. I have a very sanguine notion of the success of the treatment of this trouble, and it is based absolutely upon my observation of many cases, of which these are only representative cases.

I believe that indicanuria is not at all reliable as a symptom of anything. Given a very sluggish liver, and there will be very little indican. Indican is a product of the liver in its transposition of the products of auto-intoxication. And a liver that is not doing its work and is in bad condition will give very little indican.

I think that any treatment directed to the treatment of this condition with reference to the use of any of the internal secretions, *per se*, is futile absolutely. To me it is absurd. I never have seen an exhibition or report of cases by Dr. Nathan that would justify any credit to that method. We are succeeding uniformly only when we take into consideration and treat the symptom complex. We have not done it in all cases; but in the light of to-day we now do it in all cases, as we treat all conditions that are associated with evidence of toxemia. The more we see of disease, the more we are impressed with the things that come from toxemia due to alimentary derangement. In closing I wish to commend Dr. Hirsh for the thorough and practical treatment of the subject, and for having kindly permitted me to exhibit these cases.

SOME IDEAS PERTAINING TO ELECTRO-THERAPEUTICS.*

BY ANTHONY BASSLER, M.D., NEW YORK CITY.

Professor, Clinical Medicine, New York Polyclinic Medical School and Hospital; Visiting Gastroenterologist, People's Hospital; Chief
Gastroenterologist, German Poliklinik.

There is an aphorism which, while not distinctly appropriate, nevertheless somewhat describes the condition of affairs in which it is stated that "the camel carries the load while the dog does the panting." For a good many years men interested in electro-therapeutics have applied themselves to the treatment of patients. The beginning excessive enthusiasm in the employment of electricity was warranted. In those early days little was known of scientific medicine, the modalities used, and the methods of their application to the sick were new. Added to these was the great question as to what electricity really was, which lacked decidedly less solution than it does to-day. During many years types of modalities and many apparatuses for their generation have been employed in the treatment of disease. Much work has been done, tons and tons of paper and years in the reading of articles upon it have been devoted to the advancing of the subject, and one of my thoughts is, whether, after all the work that has been done, electro-therapeutics has reaped for itself the position in medicine deserving of it for its establishment as a branch of applied therapeutics?

To a great extent the real medical man is born with certain essentials, rather than having had these mental attributes inculcated in him by undergraduate colleges. The autobiographic study of the great clinicians of medicine totals an analysis which reads: work, experience and personal questioning. Work comprises the steady application of minute attention. It means after serious study and the degree, an association with a large number of sick, these comprising all of the various kinds of illnesses, even all of the degrees of one affection. This means hospital experience and an active connection with a hospital for years. Experience means the study of

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City, Sept. 2d, 3d and 4th, 1913.

diseases, the various shades of the different ones, and the exercise of the human attributes of observation, perception, and conception so as to build of one's self a unit possible of logic deduction in an individual case. It is qualified further, by an attention to the literature in more languages than one, and an open-hearted welcome of all things in medicine, even of those that do not pertain to one's individual interest in any branch. This likewise requires hospital experience, which in these modern times is not so much a matter of active therapeutics as it was years ago, but prominently one of diagnostics. Personal questioning is that faculty of the mind by which a physician questions his deduction by checking himself backward, that is, arriving at a diagnosis, for instance, he matches his diagnosis with the symptoms and the history, confirming if possible the diagnosis arrived at in the first direct lineal way. It is an attribute which few can exercise without making of themselves more or less of a nonentity. There are others, however, having had enough work and experience as their primary assets, who can employ this faculty with great benefit to a patient and signal service to the art of medicine and their own personal stations in it.

A serious student of medicine who reads in a quiet way and studies the literature connected with electro-therapeutics must come to the inevitable conclusion that considerable of it is advanced on enthusiasm alone—things which are born to die quickly. I am a friend of electro-therapeutics, yet I seriously question the advisability of a great quantity of the literature that has been advanced in connection with electro-therapeutics, because I have observed that a good deal of it becomes reactive in its influence upon electro-therapeutics as a substantial whole—I mean in the way of hampering its progress in the estimation of the best men in medicine. Numerous articles appear in which a large series of a certain line of cases are mentioned wherein the diagnosis is stated without as much as a qualifying symptom justifying the diagnoses as belonging to these cases. When one reads of hundreds of cases of tuberculosis treated by x-ray and cured, in which no mention is made of a physical examination, x-ray observation, bacteriological tests, or any of the tuberculin reactions having been performed in any of them, a serious minded man in medicine cannot accept the literature on its face value. The same

is true with the treatment of malignant disease, many of the abdominal conditions and others. Socrates has stated, "To the good man no evil can happen," but there are some among us whom short time and experience have not made good as yet, and we must lead wisely for this younger element. An idea here is that any article in literature pertaining to electro-therapeutics should give details connected with the diagnosis of the cases, illustrations of these cases, facts pertaining to the pathology, and also mentioning the non-electrical forms of treatment employed in the individual case. How can we ever hope to arrive at a definite opinion of the value of any measure of therapeutics unless the very closest minutia has been employed in the diagnosis and all of the methods of treatment are described.

It is not enough to say that because we have used electricity with benefit to a suffering patient, that all should use it, or that an undergraduate or postgraduate institution should include it as a department of teaching. Here and there throughout the land is a college that has a department teaching electro-therapeutics. A study of the institutions in which these departments occur shows that they have been established more particularly to instruct the men on a method of treatment which would make them more successful practitioners of medicine rather than primarily for the value that is connected with electro-therapeutics as a measure of treatment. In a number of these institutions the men who represent the important departments of medicine and surgery look dubiously upon electro-therapeutics as a benefit-giving measure, and only refer cases to that department because of their helplessness or otherwise. I am aware of the situation in some institutions where the electro-therapeutical department is a clearing house for the exterior. I mean by that cases which are cleared through it from the inside to without, in which, as I stated before, the inside men merely look upon it as a useful means to that end, rather than to have it employed because it could render a signal service to a patient which perhaps no other measure could give or bring about so well. This is an opprobrium which can best be removed by an arrangement of affairs pertaining to electro-therapeutics by the electro-therapeutists themselves. Instead of adopting the enthusiastic standard, the standard of work, experience, and personal questioning should be installed,

and such statements as are made should be accompanied with an extension of reason for the diagnosis and matters pertaining to the therapy.

It is an idea of mine that, while in many ways it is desirable to have some standards of units by which amounts and character of currents could be specified in a definite way, in the absence of these much could be done by the use of terms expressing details of technique, apparatus and appliances used, amounts of current passing into apparatus, size of revolving plates, numbers of them in circulation, the speed of rotation and others. It seems only in connection with galvanism and the qualimeters for the x-ray that there is anything definite for others to understand and follow, and these are not enough for a better guidance throughout all that electro-therapeutics comprises to-day.

I have been wondering why the best men in connection with the use of radium and allied substances, the x-ray both for a diagnostic as well as therapeutic purpose, the use of the electro-cardiogram, condenser method of muscle testing, and the like, have not come before this representative body of the medical men of America, when these subjects really belong here before they go elsewhere. Why should there be sections on electro-therapeutics and radiology (which by the way is a poor substitute for the term Roentgenology) in the International Congress of Medicine and none in the American Medical Association? An argument that has been raised is that it takes time to bring this about. This year the American Medical Association allowed a section on gastroenterology and proctology to be formed, both of which specialties are not more than twenty years old. Where is the one there should be on electro or physical therapeutics, particularly when there is one on Roentgenology, and the first subjects mentioned have such fewer men than there are in physical and electrical methods of treatment? It seems to me that such a section should be worked for and established, and water, heat, electricity, radium, and all physical measures of examination and treatment should be combined in a suitable forum in our national organization.

In this article I have expressed a few of the thoughts that have come to me lately. They are felt and given in the most kindly and considerate way. I would like to see the electric

measures of examination and treatment come to their just deserts, for I feel that not only would it be a justified recognition of the serious minded workers among you and those who have passed beyond, but it would be helpful to the public by spreading the knowledge resident within you to the many men in medicine who do not see or know, because others have not been given the opportunity to show or teach them.

Discussion.

Dr. William Benham Snow: I for one take seriously to heart everything Dr. Bassler has said. I have been urging and collaborating for an establishment of standard by this association for five years, and hope that it may be the effort of all. I cannot add anything to this address by discussion.

Dr. G. Betton Massey, of Philadelphia: The subject is so interesting that I cannot refrain from saying a few words. In regard to the question of a section in the American Medical Association, I was at the last meeting, and regretted to note that another surgical section was added to the many surgical sections already there, and also that the former obstetrical and gynecological section had been practically changed into a surgical section. I had, however, no opportunity of really appearing before the trustees, though I did appear before a committee, but was ruled out on the absence of a new petition this year. I hope that all of you who are members of the American Medical Association and would desire to register in a section on the physical forces in medicine, which seems to me to be a very comprehensive name, will sign this new petition when it is sent to you some time this fall or winter.

In other respects the paper is most suggestive and helpful. I was some years ago forced into making a microscopic diagnosis of cancerous cases that a bootblack could equally well diagnose, on account of that attitude of the profession which refuses to believe that any case of malignancy treated by any but the conventional, fashionable method could possibly be cured. I now go to a great deal of trouble in order to get a specimen before a case is treated. That has been done in all my cases now for a number of years. I recognize the full force of the argument that we must corroborate the diagnoses of our cases with those precautionary methods of diagnosis, which oftentimes, however, are no more accurate than the clinical methods of diagnosis. Sometimes they are much less accurate, for I have had a number of patients die of cancer in whose cases cancer was denied by microscopic experts.

Now as to our course in convincing the best men in the profession of the value of electro-therapeutics in other cases than those on the way to the dead house I have this to say: While a stricter observance of all the conventional methods of verifi-

cation of diagnosis should be urged, no one would ever succeed in forwarding electro-therapeutics or any other department of human effort by assuming an apologetic attitude. Enthusiasm, even if it is sometimes mistaken enthusiasm, is always necessary, whether it is in the starting of a cult for operating indiscriminately by abdominal section, or for any other method of treatment, right or wrong.

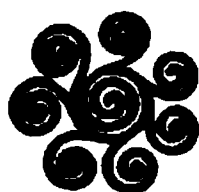
Dr. S. St. John Wright, of Akron, O.: The questions suggested by this valuable paper are of vital importance and extremely practical, because they help to direct the course of our thoughts and help us to form our plans for progress. But just consider for a moment the position of the man who assumes to do for his patients as much as is assumed by the electro-therapist, who may be called a specialist in treatment. The specialist in treatment is the competitor of the specialist in the eye and in every other department of anatomy. And just think what that means. You are expected to do what the oculist fails to do in the treatment of the eye, and you do it. And perhaps you haven't got the time nor the money nor the conveniences nor the books for records to make a complete analysis of the cases, giving the previous conditions, historical aspects and practical application. It would take more time, to say nothing of the expense, than most of us, I believe, have at hand. Surely it might be done, because it is scientific, and our statements can be proven, if we only had the time and the facilities. I hope when I get home to improve my own methods because of this paper, and I am glad I came if I had not gotten anything else. This matter is of such great importance that I am astonished that fourteen or fifteen gentlemen did not jump up at once to discuss it. The relation of the electro-therapist to scientific medicine is the relation of the expert of experts. Dr. Massey is right in saying we must have enthusiasm, because every reform in the history of the race has been led and fostered and pushed by enthusiasm. The emotions must be stirred before the intellect will get busy, and then the hands will do something. I have a case in hand in line with the suggestions of the writer, and I mean to write it up and publish it, and I mean to get all the historic antecedents and facts as they are recorded by one of our best experts in our little town of Akron in the department of the eye, ear, nose and throat. I had a patient, a young woman, who was treated by one of the best specialists in the eye, nose and throat in Ohio. He removed a turbinate bone because it was necrosed, the girl having had pain in the right entire side of the face. The symptoms persisted. He found that she had an infection of the antrum on the right side. The pain and discomfort continued. Also there was an abscess in the frontal sinus, as revealed by a skiagraph. For this the usual operation was advised. But in the intra-nasal operation into

the antrum the local anæsthetic of course failed to anesthetize the lining membrane. The memory of that painful experience led the patient later to employ more modern methods. The other side of the face began to have the same symptoms. The arc light and the high frequency current, with the glass vacuum electrodes and the application of the high tension current through an insulated wire, opened up her frontal sinus, sterilized the sinus altogether, relieved the pain, and restored her to perfect health in a very short time, and she is well now after several weeks.

Dr. Bassler: The point that I tried to make clear regarding the electro-therapeutic department of the dispensaries and clinics in connection with the colleges and hospitals as being to some extent a clearing house for the exterior is a position that has been forced upon me from personal observation in the study of a number of internists and surgeons, the truth being that they know nothing about the subject of higher electro-therapeutics. They seem but little inclined to learn, and that, to me, is a very unfortunate condition of affairs. I think if the literature and the work in electro-therapeutics are such that they appeal to the higher standards of men in medicine and surgery, namely, work that has a quality which is apparent in the first few minutes of reading an article, substantial work, work which is dispassionate rather than fanciful, it would go a long way to help. The serious minded men in medicine and surgery are good critics, and I feel that there are too few of them reading the good literature on electro-therapeutics as it deserves to be read. They have gotten into the habit of casting it out, and they must be taught different. It seems to me that you cannot go to them and insist upon it, but if the literature is of that standard quality that the importance would be recognized as soon as such a person begins to read it, it would drive its wedge in and make a substantial advance, because the advance in electro-therapeutics is in the estimation of other men, rather than our own idea about it.

As to the petition pertaining to the section: I happen to know considerable about the ways to accomplish those things. You know the gastro-enterologists went before the A. M. A. and were constantly refused. This year we accomplished the creation of a section. I fortunately headed the petition, and it is done in this way; if the committee will accept a suggestion from me, namely, to utilize all the avenues of literature that you have for the purpose of getting subscribers to sign their names on petitions, which should be separate blanks, asking for the establishment of such a section in the American Medical Association; that here and there all through the land certain men take charge of getting as many friends as they have who are members of the A. M. A. to sign one of these petitions, and then send these to some central point in the

hands of one person. Any petition that goes before the A. M. A. that represents less than 250 I am quite sure will not receive much consideration; for such would get lost in the Committee on Sections. But if you have a petition that represents 750 or 1,000 it is an easy matter. I can take half a dozen petitions and get men to sign them who are not electro-therapists, but who are members of the A. M. A., and who feel that there should be such a section, and there are many others of you who could do better. Then I think several members of the House of Delegates in several States should be approached personally; that is, asking a certain person in the State of Pennsylvania, for instance, to take these 1,000 petitions and present them to the House. We would have but little difficulty, and I surely feel if it could be accomplished along the line of all the physical forces it would come about easier.



REPORT OF THE COMMITTEE ON MECHANICAL VIBRATION, EXERCISE THERAPY AND APPARATUS.*

M. L. H. ARNOLD SNOW, M.D., CHAIRMAN, NEW YORK.

Mechanical vibration having been considered previously, this report will call attention to some of its more important uses and its latest applications.

In therapeutics it fills an important place as well as being an aid in diagnosis, and in the hands of a skilled operator it gives relief to patients whose ailments are not amenable to drugless methods and who otherwise would drift to fakirs and faddists.

In diagnosis it determines the presence, site, and degree of inflammation and pain, the presence and degree of muscular spasm, the degree of tissue irritability, and the range of mobility of a joint by the induction of lessened tension as well as the state and degree of reflex functional efficiency. It is also an aid in prognosis, as in the differentiation of a simple sciatica from a neuritis involving the lumbo-sacral cord as from pelvic tumors, luxations, or other causes. It eliminates the fear of some pathological states, by causing pseudo-conditions to disappear under treatment.

In the realm of spondylotherapy so ably developed by Dr. Albert Abrams it is an agent worthy of consideration by all. The study of spinal tenderness and its relation to the various organs and tissues as well as that of spinal control of distant parts is but in its infancy, and to my most honored and able co-workers I ask for its consideration.

The therapeutic application of mechanical vibration has been greatly broadened during the past year by its use in cases of high blood pressure, and in the treatment of a very common condition known as splanchnic neurasthenia characterized by mental depression and physical fatigue. There may be associated tenderness and enlargement of the liver, gaseous accumulations in the bowels and an exaggerated cardio-splanchnic phenomena. These patients have a higher blood pressure lying than when sitting and the postural rela-

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City Sept. 2d, 3d, and 4th, 1913.

tion of the pulse may be reversed. It is believed that certain areas of the body become engorged with blood, and it is certain that the splanchnic vessels may become so affected. This is what occurs in these cases, and that which relieves their engorgement relieves existing symptoms.

As the splanchnics have their origin from the fifth to the twelfth dorsal nerves inclusive, whose origins are from the second to the ninth dorsal vertebra, the sites of vibratory application are easily determined. Treatment has been usually given from the second to the fifth dorsal vertebra with the ball vibratode for five minutes sometimes between the second and third dorsal vertebra only, but if there was cardiac insufficiency vibration was given for two or three minutes between the seventh cervical and first dorsal vertebra, which tones up the muscular activity of the heart. As a rule these patients do not have a very high blood pressure, and many such have a cardiac insufficiency. Immediate relief follows the treatment.

To lower blood pressure applications are made for five minutes with the ball vibratode on each side of the spine alternately from the second to the fourth dorsal vertebra. It probably affects filaments of the sympathetics that emerge from the second to the sixth dorsal noted by Bradford and Dean, and whose maximum effects are on a level with the third, fourth and fifth nerves whose stimulation causes pulmonary vaso-constriction and a fall of aortic pressure. The highest point of origin of the second was the lower border of the second thoracic vertebra, and the lowest origin of the fifth dorsal was at the junction of the upper one-fourth and lower three-fourths of the spine of the fourth dorsal vertebra. The effects as a rule are more than temporary.

My honored committee, Drs. Price and Hirsh, present the following reports:

Dr. Hirsh reports as follows: "I have nothing original or novel to suggest by way of reflex studies.

It is now my rule to go over every case, on the first visit, to search for possible painful areas near the spine, and thus have saved myself not a few possible errors in diagnosis.

In view of the intended presence of Dr. Albert Abrams at our meeting, it might be well to have him thresh out here the precise relative values of spinal vibration, rapid sinusoidalization and concussion.

He also favored the solicitation from readers of case reports treated by these various spinal treatment methods.

Dr. Price states that: Mechanical vibration surely fills certain indications in therapy not easily excelled or equalled by other methods. Among these the writer wishes to refer to several conditions so treated by himself.

Several cases of fibrous ankylosis of joints evidently not very extreme, though rigidly fixed, resisted beneficial treatment by manipulation or forcible flexion and extension without anæsthesia, and in one instance even under an anæsthetic. One of these cases was uninfluenced by galvanism and the others not benefited by wave current and sparks, but were cleared up by the use of mechanical vibration accompanied by moderately forcible extension and flexion. However, in several other cases, especially those due to old and infective processes, no marked results were obtained.

Another convenient use was in a man forty years of age, who had, about two weeks previously, been thrown—in a railway accident—head first across the opposite curtain pole, his body being doubled and injured much, as he weighed over 200 pounds.

He had been confined in a hospital until this time, and his chief symptom outside of general soreness and pain was immediate and persistent vomiting after the taking of all ordinary foods, more especially upon trying to sit up. This was not accompanied by marked nausea, but by great loss of flesh and strength. The fourth dorsal spinous process was prominent and deviated to one side. Evidently a partial unilateral dislocation (or subluxation) of the fourth and fifth transverse process articulation, causing pressure on the nerves.

The patient was placed in the prone position upon supports, making the back as convex as possible and the hard ball vibrator with the dorsal muscles in this region for about ten minutes when the vibration and considerable force were exerted directly upward, on and below the displaced transverse process of the fourth vertebra, while at the same time the other hand applied pressure to the spinous process of the fifth vertebra, resulting in immediate and complete reduction of this partial dislocation, the spinous process coming in direct line.

This reduction was accompanied by a distinct slipping sensation to the hand, ending in the form of a slight snap, while

at the same time the patient expressed the feeling of some pain, which was quickly followed by complete comfort. From that time until the present, a period of several years, the patient has had no recurrence of the vomiting or such disturbance, and he rapidly regained his usual weight. These instances show the possible relaxing effect upon the muscles and other tissues from vibration without the necessity for an anæsthetic and, as in the latter case, accomplishing what an anæsthetic could not.

Under Dr. Arnold Snow's suggestion, mechanical vibration over the right interspace between the seventh cervical and first dorsal vertebrae has been used several times in different patients suffering from severe cardiac dilatation in whom blood pressure had fallen to an alarming point. The immediate effect of the vibration in different cases was marked improvement in the pulse quality and rate, the latter dropping from 164 to 138 in one case, and in another instance the pressure rose from 82 mm. to 94 mm. These patients, however, were under the continued use of hypodermic stimulation, preventing any definite information being obtained with regard to the future vibratory result.

I heartily endorse Dr. Hirsh's suggestions, and trust that others will see it in the same light.

We are deeply indebted to Dr. Albert Abrams for his most able scientific work. He has been the pathfinder, and only the most careful, earnest and honest work with the different modalities, to which I might add the static, faradic and galvanic, which travel the paths found will determine their relative efficiency and indicate the choice when all are at hand, as proven by its superiority for effectiveness and its particular adaptability to the part or condition treated, with due consideration of the patient's feelings, for heroic measures are not necessary in this age of scientific refinement and advancement.

The more mechanical vibration is used in a scientific manner and results reported the wider will become its general recognition and its scope of utility. Vibration will prove a valuable agent in the hands of such a skilled body of professional men as the members of this scientific association.

The subject of exercise therapy and apparatus, when properly considered, would be too lengthy to encroach on the

valuable time of the Association, so the writer will simply call attention to a few important points.

Exercise has long been in the hands of faddists in this country, and the number of earnest, scientific men who have advanced the subject here may be counted on the fingers of one hand. I understand that there is now a movement on foot to regulate the practice of exercise therapy by law, which will raise its standard and give physicians who send their patients to those who understand the subject the benefit.

Exercise during the past few years has become better systematized and developed along scientific and physiological lines, a valuable adjunct to which is the use of the Abbott brace, combined with proper exercise in cases of deformed spines, which subject has been thoroughly investigated and practiced by Dr. Peckham, of Providence.

Exercise is one of the spokes in the wheel of a physician's armamentarium, which he may do without, but which he is obliged to recognize in order to secure more perfect results.

2020 Broadway.

Discussion.

Dr. Francis B. Bishop, of Washington: I take pleasure in commending Dr. Arnold Snow's very able report. I want to state though that the first member of this Society to take up the question of mechanical vibration was Dr. Pilgrim, who lived ten or twelve years ago, and was vice-president of this Association at one time, and wrote a book, a very able little treatise on the subject of mechanical vibration. There is no doubt of the truth of all the statements that Dr. Arnold Snow has made in regard to mechanical vibration. She undoubtedly has given more attention to this one line of thought than any other member of this Society, or any other person in the country to-day, and it gives me great pleasure to commend highly all she has said.

Dr. A. B. Hirsh, of Philadelphia: There was a detail that I purposely omitted when writing to the chairman of this committee, and it is one that calls for especial attention here to-day; that is the fact that an authoritative work upon this subject has appeared since our last meeting in the recent edition of Dr. Arnold Snow's work on Vibration. It is far more than simply a recital of mechanical effects or the results of the use of mechanical apparatus. It goes most fully into the physiology of the subject, and is as delightful a resumé of that field as you will find anywhere. It is unfortunate that the works extant on the internal secretions (which are unques-

tionably influenced by treatment of the dorsal regions, through the posterior nerve roots affecting the centers in the spinal cord) are either too brief or so full of technical detail as to make them exceedingly tiresome. The physician who will take Dr. Arnold Snow's last edition on vibration with reference to any case about to be treated, and will go over that particular chapter, will find this "fault" missing, and so be fully recompensed for having the book in the library.

Dr. W. W. Wilkinson, of Phoenix, Ariz.: Just a word concerning slight dislocations. Some years ago in the mountains of Colorado, while maintaining a hospital in a mining camp, I was called one morning to see a man who had fallen backward the previous night, while in a sitting position, from an elevation of sixteen feet. I reached him about eight hours after the accident. At that time he was completely paralyzed from the waist down, but had not been so immediately following the accident. He lived seven weeks. The rectal and bladder sphincters were also paralyzed. We cut down on the vertebrae in the dorsal region, and could not find any evidence of dislocation on examination. Post mortem by passing our fingers up and down the vertebrae anteriorly was found a slight dislocation. It was about the ninth dorsal vertebra. On opening up the canal there was just a barely noticeable break in the contour along the anterior side of the canal, and yet that slight dislocation had maintained this complete paralysis and caused death within seven weeks.

So that it seems to me we should be very careful when we talk about dislocation, when that dislocation, apparently so slight, produced so serious a condition.

Dr. Louis von Cotzhausen, of Philadelphia: I listened with a great deal of interest to Dr. Snow's paper, especially as I reviewed her book. I am sorry Abrams is not with us. Dr. Arnold Snow's book has certainly given us something we have not possessed heretofore, and in itself is an exceedingly valuable addition to the literature on this subject.

Going back to Dr. Price's dislocations, I for one have very little confidence in these dislocations of the spinal vertebrae. I have studied them up with the view of using vibration, or spondylo-therapy, or reflexo-therapy, as I prefer to call it. Since last year I have done a great deal of work in that line, and I have yet failed to find the first spinal dislocation. In all those cases—and prominent men will agree with me—we have simply a sprain, or some defect, or some out-of-the-way condition of the ligaments or the muscles holding those spinal vertebrae, and not of the bones themselves. For my part, I have come almost to the conclusion that there is no such thing as a spinal dislocation. When we have that the patient usually is dead. When the spinal column is dislocated the spinal cord is apt to be injured, and nothing will do it any good. In nine

hundred and ninety-nine cases out of a thousand it is simply a question of the ligaments or the muscles. There is no watch built as finely as our spinal column, and when we have an apparent dislocation we have simply a separation on one side and a pulling together on the other side. Why do osteopaths and neuropaths get good results? Their most eminent men say that when they are successful they are simply good masseurs, and when they are bad masseurs they do mischief.

I have the greatest admiration for Dr. Snow. She has certainly given us new data, and everything in that line helps cure our patients. She has gone deeper into it than any book I have read on vibration, and she is certainly an authority on that subject.

Dr. Mary Arnold Snow: I would like to say just a word in reply to Dr. Cotzhausen in regard to Dr. Price's cases. Dr. Pilgrim studied vibration under an osteopath, and his view was that vibration of the fourth dorsal on the left side would open the pylorus. I will let Dr. Price respond to the discussion of his report.

Dr. Price, of New York: Dr. von Cotzhausen says that he has very little confidence in dislocations of the spinal vertebrae—probably his confidence would increase should he be so unfortunate as to obtain one in himself.

He says he has studied them up since last year, but even so has failed to find one. They are more likely to be found, or when found more real, in the human being than in books, though their existence is frequently affirmed in books. He says that in all those cases we have simply a sprain, or some defect, or some out-of-the-way condition of the ligaments or muscles holding those spinal vertebrae. I agree with him, and as a result of "some defect" or "out-of-the-way condition" (which he admits) sometimes slight displacement of one or more articular surfaces occur and sometimes severe, for with such stretching or tearing of attachments (as recognized by authorities) the support to the articulation is weakened, but fortunately the patient does not always die—one is occasionally seen walking around long afterwards.

He later admits and places the proportion of such dislocations as 1 in 1,000. If he means by that, one dislocation to every 999 spinal injuries, I do not doubt that his percentage is liberal. If, however, he implies that the 999 are diagnosed as dislocations, I would prefer to believe the more practical men who saw the cases and made the diagnoses.

He further says that "when we have an apparent dislocation, we have simply a separation on one side and a pulling together on the other side." Precisely so, and this "separation" either is, or may give rise to, what is quite correctly termed a partial dislocation, or subluxation.

One year is not long enough time in which to search for a

surgical accident of unusual character, before deciding that none exists. I have seen, and only seen, about five such cases with other men during nineteen years of fairly wide experience.

It is highly improbable that the many volumes on surgery written by reputable men of experience and knowledge, in which they describe and give statistics of slight and severe unilateral and bilateral dislocations of all degrees and forms—some dying, some recovering—a small percentage being of the kind described by me and in no sense unlike it, will ever be modified by any dreamer's theories as to "improbabilities" based upon the *absence* of knowledge and experience.

What I saw and know I have related. Surgical conditions deal with "facts and conditions," not with "probabilities" or "improbabilities."

With regard to Dr. Wilkinson's case: This was an entirely different sort of condition (no resemblance whatever to the subject under discussion). In it the size of the spinal canal would be altered because of the displaced *bodies* of the vertebrae, naturally causing serious pressure on the cord. In my case, there was evidence only of slight, though important, disturbance in the *process articulation*, which, practically, would not alter the bodies nor of necessity cause pressure on the cord.

RADIUM, ITS EMANATION AND THE EMPLOYMENT OF BOTH FOR HEALING PURPOSES WITH SPECIAL ATTENTION TO THE EMANATION CATAPHORESIS IN THE ELECTRIC FOUR CELL BATH (DR. SCHNEE'S SYSTEM).

BY T. E. GURTNER, M.D., NEWARK, N. J.

(Continued from page 416.)

The skin can be made more sensitive to the radium rays by means of the production of an artificial inflammation or through the injection of eosin or fluorescence.

The physiological effects of emanation show themselves in a reddening followed by a scaling off of the skin. By strong concentration, the emanation is death to bacteria, and exerts a powerful influence on all fermentative processes.

Bickel and Bergelt have proved that the retarding influence of salt solutions on the pancreas and pepsin is raised through emanation. Lowenthal and Edelstein found that the antolysis is accelerated. Lowenthal and Wohlgemut made the discovery of the influence on diastatic ferments, Hosliman and Furstenberg the discovery of the influence on fermentative processes. Silbergleit and Kyoddi as against Plesch and Lowy affirm an increase of changes in gases through emanation, whereby the consumption of oxygen is raised and the giving off of carbonic acid is increased. The blood pressure is lowered while breathing in an emanation laden room and later rises again. The temperature of the body drops after a preliminary rise up to 0.5° C. for the rest of the course.

No particular affinity of the blood for emanation could be proved, and the emanation gas acts toward hæmoglobin like an indifferent gas (Plesch). (The emanation has no affinity for anything per se, its disintegrated products have.)

After inhalation, Kohlrausch was able to prove the presence of emanation in the lungs, liver and gall, but not in the other organs.

According to Gudzent, gout is to be considered as uric acid deposits in the blood. In his opinion the uric acid slowly develops in the blood, is slowly dissolved and slowly excreted. Uric acid, the mononatriumurat, occurs in two equal forms,

laktamurat, one form is soluble but unstable; laktimurat, the other form, is insoluble but stable. The transmutation of the soluble into the insoluble form is prevented by the emanation, and relatively the insoluble salt is changed into the soluble. The greatest part of this effect can be attributed to Radium D. Finally the mononatriumurat is worked off into carbonic acid and ammoniac. Venaesections before and after treatment with emanation have shown that people who have had uric acid lost same under the influence of emanation. Also the tophi (gouty knots), caused by the uric acid deposits, disappear under the influence of the emanation. Gudzent has further shown with the aid of Lowenthal that the excretion of the uric acid is increased during the emanation cure. Finally, Falta and Schwartz showed that through the employment of the emanation the growth of plants was noticeably promoted.

For therapeutic purposes the emanation is given in the form of baths by means of cataphoresis, by inhalation, drinking water, compresses and injections. The emanation is chiefly absorbed through the lungs and the intestines; relatively through the skin, in the latter case, however, only by cataphoresis in an appreciable quantity. The excretion takes place through the lungs. The presence of emanation is very seldom detected in the urine, and only in very small quantity in the faeces.

Neusser first employed radium emanation for rheumatism and tuberculosis peritonitis in 1905, and attained good results with it.

It is a well-known fact that miners who work in mines having water rich in emanation very seldom suffer from rheumatism or gout. Lowenthal tested this fact scientifically, and proved the wonderful power of emanation against gouty afflictions.

We now know that sub-acute and chronic gouty and rheumatic ailments represent the main field of cures by means of radium emanation. The more recent the changes are and the more they extend to the softer parts the greater is the outlook for results. Stiffness of the muscles and muscular pains are greatly benefited by radium emanation treatments. The same is true in ischias and the sharp stinging pains of tuberculosis of the spinal marrow, as well as insomnia due to nervous

causes. Even if worse pains result for several days after the use of the emanation, the patient must guard against stopping treatments prematurely. In such cases it always means simply reactionary symptoms after the disappearance of which good results can positively be expected.

Should the question come up, which form of emanation treatment is the most successful, then the cataphoric treatment with emanation by means of the electric four cell bath (system of Dr. Schnee) must be given a prominent place alongside of the easily dispensed emanation inhalation and emanation drinking water cures.

In 1909 Schnee made his first experiments in this direction, and at that time already noticed the following:

The solubility of emanation, combined with its electrically positive charge, leads us to unconsciously think of cataphoresis, electrolytical dissociation and iontophoresis, and to bring under consideration the question, "How far would these properties of emanation prove valuable therapeutically?"

These are the main points which governed his experiments, and he found that they are the results more of a practical rather than of a detailed experimental study.

Afterwards it was his aim to discover whether the absorption of emanation by means of cataphoresis through the four cell bath were really possible, and if this result should be positive whether this absorption could be considered sufficient to accomplish permanent results according to therapeutic ideals.

For the first experiment apparently healthy people were used. For later ones, on the contrary, wherever possible, only those having articular and neuralgic diseases, because he considered it better to cut out all problematical cures or improvements and to keep the indications within certain limits from the beginning. By this means the possibility of later widening the limits of this new healing power was in no way hampered and only reckless quackery was prevented.

Of the three healthy subjects of experiment, whose respiration and urine proved by examination to be free from emanation, one received 50,000 emanation units in a half liter of water to drink three times; the second the same quantity at equal intervals in a luke warm full bath of 33-35° C. in a bath-tub covered with a sheet lasting 30 minutes; the third

received, at the same intervals, a four cell bath of like duration with positively charged arm tubs, each of which had 25,000 emanation units and the same temperature water as the full bath. The current strength used in the four cell bath was 5-10 and 15 M.A. The examination which was made for the radioactivity of the respiration and the urine taken for six hours after the absorption of the emanation charged water in the respective treatments gave a negative result in each case after the full bath. Whereas after the use of the emanation per os as well as after the cataphoric absorption of same it showed strongly a positive reaction. Naturally, the greater amount of the excreted emanation fell upon the respiration.

As a matter of course, the radioactivity was stronger after the use of emanation per os than after its cataphoric absorption, but it could be detected in the latter case long after it had disappeared in the former.

According to this preliminary test the cataphoric absorption of the emanation was proved, and seemed to be all that could be desired for attaining therapeutic results.

The results just mentioned, however, also justify the belief that in a radioactive bath without cataphoresis the absorption of the emanation into the body is too trifling to make itself apparent in an after examination.

In the following lines I will now try to analyze the therapeutic results which I have attained in various cases of chronic arthritis, sciatica and tabes dorsalis.* In each of these diseases I treated one case entirely with the regular four cell bath, for the sake of comparison, and all the others at the same time with emanation cataphoresis without the patients having any knowledge of the change in medication. By this means I wanted to prevent any suggestive influence. The results of my experience will be seen from the accompanying table.

From this table it is shown that the average number of the otherwise equally timed applications was decreased in the emanation medicated treatments. It becomes more important when the fact is emphasized that whereas following the four cell bath without emanation improvement in the malady present appeared after 8.5 to 11 baths; in the case of emanation medicated baths it already appeared on an average of 5 to 7 baths. Finally, it showed that once started the improvement

in the latter baths was of a lasting character and seldom resulted in any relapses.

COMPARATIVE TABLE.

Total Number of Cases Treated, 15.

| | Chronic Arthritis, 7. | Ischias, 5. | Tabes Dorsalis, 3. |
|---|--------------------------|--------------|-----------------------|
| Treated with ordinary F. C. B. | 1 | 1 | 1 |
| Number of treatments... | 18 | 9 | 23 |
| Length of each treatment. | 30 minutes | 30 minutes | 30 minutes |
| Reaction after..... | 5 treatments | 3 treatments | — |
| Improved | — | — | 1 |
| Cured | 1 | 1 | — |
| No result..... | — | — | — |
| Treated with four cell bath and emanation cataphoresis (50,000 units per treatment)... | 6 | 4 | 2 |
| Average number of treatments | 14 | 7 | 19 |
| Length of each treatment. | 30 minutes | 30 minutes | 30 minutes |
| Average of reaction after. | 4 treatments | 2 treatments | — |
| Improved | 3 | 1 | 2 |
| Cured | 3 | 2 | — |
| No result..... | — | 1 | — |

As far as possible, I watched the patients personally after completion of the cure, and from reports of their present condition I can positively assert that the results of these cures continued, and after several months there were no complaints of any reappearance of the malady.

Any hurtful influence (as albuminin, etc.) could not be proved even after accurate urinalysis and otherwise painstaking care.

In ten cases a positive reaction took place; in five it did not show. Of these ten cases, eight were treated with Emanation Cataphoresis. The appearance of the reaction in the latter showed itself, as the average results testify, sooner than with the ordinary four cell baths. It is worthy of note that it was just the tabes cases which showed no reaction in both forms of treatment, but found without exception relief from their shooting pains.

A case of chronic arthritis showing no reaction was cured. A similar case of ischias benefited. Also, as shown by Strasser and Selka, it is very difficult, because of the nature of the cases coming for treatment, to make entirely uninfluenced observations because the effects are only of a subjective nature, and one has to depend on the more or less trustworthy statements of the patients.

As a result of experiences thus attained, finally reached the following conclusions:

Compared to the methods of treatment used up to the present time, Radium-Emanation in the form of radioactive full baths, drink-cures and inhalations, the Cataphoresis of Radium Emanation by means of the electrical four cell bath recommends itself especially in such cases as by the use of the Emanation Therapy on the one hand and Electro-Therapy on the other, have already shown favorable results, because such cases show an acceleration of the improvement of the malady present under the influence of the cumulative effects of both methods of healing respectively. (the healing of the disease processes is easily proved). The field of indication of radium cataphoresis is unlimited, and promises good results in a number of other diseases also.

Further experiments which Schnee conducted until quite recently in connection with Emanation Cataphoresis in relation to his four cell bath prove his former points fully, and show also that besides gout, rheumatism and muscular stiffness, muscular pains and neuralgic maladies of all sorts can also be successfully fought with his new method of treatment. Besides these good results, the emanation cataphoresis is to be given the preference over the much used emanation inhalation, because the latter, to give good results, must be taken two to three hours daily, whereas in the emanation cataphoresis the same results can be attained in sittings of 30 to 60 minutes each.

126-130 Court Street.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M.D., LOUISVILLE, KY.

The Neglect of Hydrotherapy in America. By. Joseph H. Pratt, M.D. (*Boston Medical and Surgical Journal*, June 5, 1913.)

Pratt again calls attention to one of the curious paradoxes of medical practice in America, the neglect of hydrotherapy. For years American writers, like Baruch, Kellogg, Solis-Cohen, Pratt and the writer of this editorial, have been constantly by word of mouth, articles and editorials calling the attention of the profession to the great value of this agent. Pratt says there is no American university, except Columbia, that requires of its medical students a practical knowledge of the subject.

The writer for many years taught hydrotherapy in the medical schools of Louisville, Kentucky, but since he severed his connections therewith, five or six years ago, the students have had no teaching along that line in their curriculum. As Baruch has well said: "Much time that is wasted in teaching the properties and applications of drugs, which are rarely used in practice, could be profitably devoted to the clinical study of the action of the most powerful remedial agent." Pratt gives an interesting account of the youth of Winternitz; of his early experience with hydrotherapy; of his enthusiasm after trying its action; of his persistent and painstaking efforts to make hydrotherapy scientific; to raise it from the hands of the quack and charlatan and place it in its proper niche in therapeutic medicine.

That it has been a labor of love and an uphill fight goes without saying, and it is indeed disheartening, as Pratt and others say, to continue this work with so little help, so little encouragement, and so little interest on the part of the medical profession, who seem to be wedded to either surgical procedure or drug medication.

He quotes Solis-Cohen as saying, and let us add it is true, that: "Let a man report to the ordinary medical society—not including this section of the American Medical Association, the results were only scientific electrothérápy, hydrotherapy, aérothérápy, pneumothérápy, thermothérápy, psychothérápy,

phototherapy—nothing except x-ray, which are getting to be semi-respectable—and at best he is listened to with polite indifference; seemingly he is not listened to at all. It takes the heart out of anyone to be treated in that way.”

No one can sympathize more, from his personal experience, with Drs. Cohen and Pratt than the writer, and it is to be hoped that the constant drip of the water of hydrotherapy literature will soon wear away the granite like stone of professional indifference upon which it has been dripping.

It is no easy task to convince the physicians of America that they must use hydrotherapy, if they are to do their full duty to many of their patients, but we can labor to that end. The obligation to teach hydrotherapy cannot much longer be ignored by medical faculty. C. P.

RADIOGRAPHY.

EDITED BY FREDERICK M. LAW, M.D., NEW YORK.

X-Ray Examination in Habitual Constipation. By E. H. Skinner, M.D., Kansas City, Mo. (*Journal of the Mo. State Medical Association*, August, 1913.)

Dr. Skinner advises fluoroscopy in addition to radiography, as it shows the change in position of the viscera by voluntary movements of the abdominal muscles and diaphragm, and permits of the ability to palpate the abdomen during the examination.

Dr. Skinner gives the usual time for the passage of the bismuth meal in the normal individual as follows: The stomach is empty in five to six hours; the caecum should be reached in about four and one-half hours; in eleven to sixteen hours all except occasional traces of bismuth should be in the descending colon; in twenty-eight to thirty-two hours it should be in the sigmoid, where it remains till defecated.

The doctor divides habitual constipation into several types, which are determined by characteristic x-ray findings.

1. Hypermotility of the proximal or first half of the colon. In this type the colon is normally placed in the abdomen and six hours after a bismuth meal shadows can be seen as far as the descending colon. The rest of the bismuth is distributed throughout the caecum, ascending and transverse colons. At the end of twelve and twenty-four hours the opaque shadows in the caecal and hepatic areas are increased in size, and there is little, if any, filling of the pelvic colon.

2. Ascending type of constipation or the caecal type of

habitual constipation. Six hours after the bismuth meal the terminal coils of the ileum are well filled, and there is a small caecal shadow. At twelve hours the terminal ileum is empty and the ascending colon well filled. At twenty-four hours the caecum is filled and distended, and probably has dropped into the true pelvis. The transverse and descending colons may show scant shadows. Shadows of bismuth remain in the proximal colon as long as three to fourteen days.

3. The atonic ptosis type of colonic constipation. This type shows practically the same findings as the previous type, with the addition of anatomical disturbances, such as the low position of the hepatic and splenic flexures.

4. The dyschezia of Hertz, or rectal constipation: The bismuth meal reaches the pelvic colon in the usual length of time, but collects in the sigmoid and rectum, distending them.

The doctor considers this the most frequent type of habitual constipation among American and English people.

DIETETICS AND ORTHOPEDICS.

EDITED BY FRANK E. PECKHAM, M.D., PROVIDENCE, R. I.

Some Reasons for Eliminating Meat from Our Diet. By J. H. Neale, A.B., M.D., Atlanta, Ga. (*Charlotte Medical Journal*, January, 1913.)

This author opens with the axiom that "the most desirable food is one that will supply the needed nourishment with a minimum of wear and tear on the organs of elimination and assimilation."

Flesh meat contains the extractive creatin, creatinin, zanthin, hypoanthin, lecithin, matter accompanied by poison, which causes Bright's disease and death. In the case of a young man who was a vegetarian and whose 24-hour urine showed 24 grams of urea, after a meat diet of 48 hours, the 24-hour urine showed 96 grams of urea. Statistics show that every twelfth adult dies of Bright's disease, showing that too much meat with its accompanying poisons is ingested.

Chittenden's and Fisher's work is referred to, and also statistics showing a very large percentage of tuberculous cattle is used as an argument against meat eating. Prof. Fisher's experiments at Yale are quoted, showing that the athletes abstaining from flesh are capable of doing much more physical work than the flesh eaters.

Another interesting fact brought out is that those flesh eaters who at the same time use alcohol and tobacco, when they become vegetarians lose their desire for them. This should be of much assistance in treating such conditions.

The Physiological Treatment of Flat Foot. By Jacob Teschner, M.D., New York. (*New York Medical Record*, July 12, 1913.)

In a very short paper the author states in the first place (and correctly) that this subject is of "tremendous importance," and then offers very proper objections to the treatment of such conditions by supports. He restores the balance of the feet, saying this can be readily taught and restored, but neglects to state how he accomplishes it. He also states that the "exercises must be demonstrated to be understood," that they are "few in number" and "can be readily executed in ten minutes."

[The gymnastic treatment of the above conditions is really "the treatment," and "convincing" interest would undoubtedly have been excited if a diagrammatic scheme of illustrations had been employed.—Ed.]

PHOTOTHERAPY AND DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M.D.

Electrical Procedure in Diseases of the Skin and Mucous Membrane. By W. Knowlsley Sibley, M.A., M.D., Physician to St. John's Hospital for Skin Diseases, London, England. (Abstracted from the *Urologic and Cutaneous Review*.)

The author describes at some length the old methods of treating skin diseases by ointments and lotions and such drugs as arsenic, which in the majority of cases could not be taken, as it upset the stomach of the patient, or else gave rise to other skin phenomena, such as pigmentation, keratosis, etc. He then goes on to describe the action of the different electrical methods, such as electrolysis, ionization, high frequency currents, x-rays and radium, as curing the disease more satisfactorily and permanently. He speaks of the chemical action of the constant current causing a condition called electrolysis in an electro-conducting media, such as the tissues of the human body. This cauterizing or destructive agent is especially useful in removing navi, moles, warts, benign tumors, cysts, fibromata, ganglion, etc.

He mentions the ionization of zinc salts as being curative in the various forms of tuberculous skin diseases, especially the non-ulcerated form of lupus vulgaris. Old standing tuberculous sinuses may be healed by the insertion of a zinc electrode, covered with lint soaked in a 2 per cent. solution of zinc chloride or sulphate. Warts are cured by the introduc-

tion of magnesium salts, and corns by zinc ions. Chlorine ions will absorb and remove scar tissue, whether the result of burns or surgical operations.

The high frequency currents are curative for all local pruritic conditions, especially pruritis ani or vulvae. The glass vacuum electrode is applied to the region daily from 10 to 15 minutes, and clears up most cases after from six to twelve applications. Many other skin diseases can be cured by these currents, such as chronic eczema, seborrhea, alopecia, lupus erythematosus, chronic ulcers, acne, vulgaris, etc.

He thinks the x-rays correctly applied will cure most forms of skin cancer, such as rodent ulcer, and will also heal up chronic ulcers, varicose, indolent and tuberculous, including those of lupus vulgaris. The tumors of mycosis fungoides are rapidly dispersed by the x-rays, one application often being sufficient to remove a fairly large tumor.

Tuberculous glands react very favorably to repeated doses of one-third to one-half Sabouraud's pastille dose. And there is no risk of distributing the bacilli into the general blood stream, thus setting up a disseminated tuberculosis, which is always possible after removal by the knife. Nearly all forms of skin diseases, such as eczema, psoriasis, lichen planus, etc., are locally cured by the application of the x-rays.

He thinks the question of the exact doses of rays necessary or most appropriate for the treatment of the various skin diseases is, and always will be, largely one of personal experience and must vary with each particular case and on every separate occasion, according to the appearance of the lesion before each treatment.

He thinks there is no doubt that the tendency among x-ray workers at the present time is to give smaller doses at rather more frequent intervals than was formerly the case.

A few dermatological facts should be remembered. The skin has been proved to absorb about 50 per cent. of the average dose of the x-rays, so that only about half of the rays penetrate the skin and act upon the subcutaneous tissues.

Taking the pastille of Sabouraud as the standard to calculate the maximum dose of the rays which the skin will stand without the production of a severe erythema, the various doses usually employed are calculated as $1/5$, $1/3$, $1/2$, $3/4$, $7/8$ and $1/1$ of the pastille. It has always to be remembered that the effects of repeated doses of the rays are cumulative for at least a period of three weeks; that is, the skin requires three weeks to recover from the effects of a therapeutic dose of the rays. The operator must therefore be careful not to administer more than the total of a full dose within a period of three weeks.

Different types of skin lesions react best under different

plans of dosage. Thus, a dose between $\frac{3}{4}$ and $1\frac{1}{2}$ (which should not be repeated for three weeks) is the best type for the treatment of ringworm, favus, hyperidrosis, keloid, angiomas, warts, navi, flammei, certain benign tumors, such as fibromata, myomata, lipomata and epitheliomata of the skin, especially rodent ulcer. A $\frac{1}{2}$ dose may be repeated in fourteen days, and then another in three weeks. This second plan is best for the treatment of warty tuberculosis, such as hypertrophic lupus both of the skin and of the mucous membranes, ulceration, tuberculosis of the skin, sinuses, scrofulous glands, etc.

A $\frac{1}{3}$ dose is the most satisfactory system for the cure of many of the chronic and persistent types of dermatoses. This dose can be repeated in a week, then after fourteen days, and then after three weeks. It is especially beneficial in chronic eczema, mycosis fungoides, seborrhoea, psoriasis, pruritus ani and vulvæ, prurigo acne vulgaris.

A $\frac{1}{5}$ dose can be repeated weekly, and is the most convenient plan for the milder forms of skin disease occurring in susceptible regions, when it is only necessary to produce a slight effect on the surface.

ERRATA.

In third paragraph of article by Dr. F. C. Tice, October issue, page 408, read eadem for eadim.



The Journal of Advanced Therapeutics

VOL. XXXI.

DECEMBER, 1913.

No. 12

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CARDIAC COMPENSATION.

Various uncertainties arise in the minds of the reader of current medical literature as to what some writers would convey when they refer to "*cardiac compensation*." It may be more clearly understood by another term, *cardiac efficiency*, implying that the heart is normally capable of overcoming any resistance in its path of the blood stream, it returning regularly to the right side of the heart without the presence of oedema in the extremities; or that the heart is capable of carrying out the round of the circulation effectively.

The capacity of the heart when properly nourished and sustained is remarkable. When, however, nutrition is interfered with, whereby the circulation to the heart, its source of nutrition, is impaired or the quality of blood is not of the character to sustain its normal function, then only can we look upon the heart itself as being incompetent. The time was when cardiac hypertrophy was looked upon as a disease instead of being considered as evidence of the heart's extra development to meet the extra work put upon it by increased resistance. At the present time, however, this is recognized by physiologists and by all intelligent students of medicine.

When hypertension exists throughout the arterial system excited by any cause, the labor of the heart is relatively increased and the cardia develops a muscular capacity to carry out the increased work. Some present day writers are misleading, implying that if anything is done to lighten this bur-

den by relaxing the arterial muscles compensation would be interfered with. It is incredible that any modern teacher could have such an opinion except from the point of view of employing cardiac depressants. When, however, the resistance is due to parenchymatous inflammation of the kidney, the general tension is raised, probably in response to the irritation caused by the urates circulating in the blood. Hypertension then overcomes the resistance of the inflamed kidney. Then the high arterial tension is compensatory, as well as the cardia. This is physiological. The high arterial tension as it exists in most cases is not due to resistance in the kidney, but to arterial tension arising from toxic irritation of the adrenals or of the cardio vascular centers. The heart consequently becomes hypertrophied to compensate. The arterial tension is only compensatory when other resistance, as a parenchymatous nephritis, causes it to be.

High arterial tension arises from auto-intoxication, and when it exists without the evidences of parenchymatous nephritis or dilatation of the splanchnic vessels, it is an indication of auto-intoxication, and a warning for a change of diet and correction of other habits which tend to further the toxic processes, together with a restoration of normal function to the liver, whose essential function is to convert toxic elements in the blood into innocuous bodies.

A recent editorial in the *Therapeutic Gazette* is bound to mislead careless observers, because it does not consider the causes of hypertension, and without recognizing other conditions, states that "high blood pressure may be said to be, in a majority of instances, as necessary for the maintenance of an approximately normal existence as cardiac hypertrophy is essential if life is to be maintained in the presence of chronic valvular disease."

In this statement the writer's observations are in accord with the physiological law of exercise, but that high arterial tension should be controlled and its causes and consequences be removed does not receive his consideration. The presence of irritants or toxic poisons which act upon the adrenals or directly upon the cardio-vascular mechanism, to cause a rise in arterial tension, receives no comment in the editorial. The writer seemingly presupposes that the tension exists to be overcome, not heeding the important matter in the case—the

cause and its correction. Until the members of the medical profession who teach or write cease to look upon hypertension in all cases as a process of the *vis medicatrix naturae*, deeming the existing condition pathological and to be met by cardiac compensation, not recognizing it to be a functional derangement to be relieved, the unthinking members of the profession are certain to be mislead,

As stated in an editorial in this journal for November, hypertension does not exist without a cause, and the cause in nearly all cases is intestinal toxemia. It is a matter of the utmost importance that the clinician should not ignore this important fact, especially so when the toxic poisons are certain sooner or later to produce other local or general pathological conditions, as well as leading on to chronic hypertension with the consequent arterial degeneration and ultimate interstitial nephritis. Unless these questions are squarely faced, and the clinician looks beyond the symptom of hypertension and cardiac hypertrophy into the true relation of the conditions causing the symptoms and its correction or removal, progress will not be made towards the alleviation of the ultimate consequent arterial and cardiac lesions.

The profession will go far wide of the mark in the management of conditions which lead to the very large number of diseases arising from toxemia and their consequences, if they ignore the acknowledged causes. The writer of the editorial referred to falls back on the theory "that nature often knows what is best for the patient, and the physician should not meddle with nature's methods until he has good reasons for believing that they have become injurious, or, if we may use such a term, unwise." Under the condition referred to, nature is *hors de combat*, and calling for relief.

His dominant idea seems to be that nature produces this hypertension as a defence, whereas the defence would be unnecessary if the cause was removed. Furthermore, it is far from being demonstrated that hypertension arising from the effects of toxemia is a natural process of defence, and not due to the effects of irritants which produce hypertension without any tendency to alleviate the existing condition. In other words, a vicious circle is created in which the poison acting upon the adrenal or cardio-vascular centers induces a condition without effecting relief thereby. The contrary seems to be

assumed in the editorial referred to. How then is to be reconciled the fact that in these cases treated indifferently by the use of drugs the tendency is for the tension to steadily increase?

The editorial in the last paragraph quotes from a case published in the London *Lancet* for May 3, 1913, as follows:

"He cites an interesting instance of a man of sixty-five who had a blood-pressure of 180 millimeters of mercury, an enlarged heart, and dyspnea on exertion. There was no albuminuria, and the vessels were not palpably thickened. Mantle recognized the fact that his difficulties depended more upon his pressure being lower than upon the fact that it was too high, and instead of giving him treatment designed to reduce his pressure he gave him strophanthus and nux vomica to raise his pressure and Nauheim baths and Schott exercises to open up his peripheral circulation, with the result that after three weeks' treatment his blood-pressure was 195, the heart more regular, and the disagreeable symptoms in abeyance. Later when his pressure was 200 he was very comfortable. Instances of this kind might be cited in great number. They serve to impress upon us a very important clinical fact worthy of the consideration of every clinician, whether he be in medicine or in surgery."

This case amply indicates a dangerous point of view. In this instance there was no evidence of kidney lesion, but hypertension and dyspnea. It was probably a case of splanchnic dilatation, one in which, if the pulse and pressure had been taken lying and sitting, it would have been found that both pulse and pressure were higher when lying than when sitting. This is a class of cases in which the hypertension is regularly compensating, but where a condition exists the removal of which would be immediately followed by a fall of pressure and absolute disappearance of dyspnea. If, on the other hand, it were not a case of this sort, but a case of hypertension of another type as assumed in the editorial, what would be the indicated treatment, the administration of digitalis to raise the pressure, or the employment of auto-condensation to lower it? In either case the dyspnea would disappear. If the pressure were reduced to 145 mm. with the adoption of a low protein diet, which would cease to cause the hypertension, the condition of the patient would be rendered safe; whereas, under the drug treatment referred to with a tension maintained at 200 mm., the man's life is in constant peril from possible apoplexy.

The clinician familiar with all of the causes of hypertension knows that high pressure and dyspnea would not be cured when dilatation of the splanchnic vessels is present and not corrected, which is readily corrected by the employment of appropriate methods. It may be said, on general principles, in this connection, that in cases of hypertension in which arterial tension is not due to other obstruction in the path of the circulation than the more common cause—toxemia—three indications are to be met: (1) the most important, a moderately low protein diet; (2) a reduction of the blood pressure to a lower point at which compensation is complete, which will be many millimeters lower than the hypertension point; and (3). after reduction below 160 millimeters, the institution of regulated systematic exercise. Under this regime advancing arterial degeneration will be stayed, the patient's condition rendered comfortable, and his life prolonged for many years, with the danger of apoplexy and otherwise pending nephritis removed.



A PLEA FOR A SCIENTIFIC TEACHING OF ELECTRO-THERAPEUTICS.*

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The employment of electrical currents in therapeutics has occupied the attention of the medical profession from early times. In fact fifty years ago little else was thought of its practical value, except its use as applied to the human body and its application to telegraphy and for electroplating. The crude batteries and static machines in use by our medical ancestors were subjects of interest and curiosity to our youthful minds.

Little was dreamed then of the wonderful commercial or curative possibilities which have been realized in our day. I well remember hearing the statement made by that great man and teacher, Prof. Charles F. Chandler, in a lecture before the students of the College of Physicians and Surgeons, in 1883, that "electricity would never be of practical utility as a motor power except for light power purposes, such as running sewing machines." How different has been the realization.

In all the fields of utility three essential effects of electricity are recognized: (1) *the electrolytic*, (2) *the thermic*, which includes light production, and (3) *the mechanical*. It is for these same effects that we employ it in medicine.

Like most else in medicine, the use of electricity was, and is still, too often empiric. This was excusable so long as the knowledge of its properties and the physiological responses to its application were limited. Now, however, in the light of the twentieth century there is little justification for its empiric employment. In the therapeutic uses of electricity and other physical agents this is peculiarly the case, because in accord with the physical laws of effect they induce physiological responses which are generally discernible or capable of clinical demonstration.

The earnest student of physical therapeutics, as of other things, must therefore know or discover three things with reference to the scientific use of physical measures in medicine, viz., *how*, *when* and *why* he uses them, the most important of which is *why*.

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, at New York, September 2, 1913.

The blind or empiric employment of physical agents, or the use of one measure or method to the exclusion of all others, some of which are demonstrated to better meet specific indications for the relief of different phases of human suffering than others, can only be justified by ignorance of the peculiar effects of each. We live in an age of progress with new developments in all fields of endeavor, and so wide is the field that none of us in our finite scope are able to keep pace with all of the developments of our profession. For this reason we should be alert and not shut ourselves in, but always investigate before we condemn what others are doing. An electric modality should never be studied in other than a relative way as compared with the effects of other modalities, from a purely physical and physiological point of view.,

To simplify the comparison of electric modalities no plan is so comprehensive as to consider them from the three recognized effects referred to: *electrolytic*, *thermic* and *mechanical*, in connection with the physiological effects of each upon the human organism.

Electrolytic action is derived practically only from the constant or direct current—a current of relatively large amperage and low potential or voltage, as applied in therapeutics.

The constant current, when compared with the static and high frequency currents, is a current of relatively large amperage and low potential, the voltages usually employed in therapeutics ranging from 60 to 120 volts, and the amperage from 1 to 1,000 milliamperes, according to the indications. This current may also be applied for other effects, but its most important field of application is that of electrolysis or ionization.

The physiological actions of the constant current are electrolytic and with strong currents thermic, but not of practical value for the induction of hyperemia. The mechanical action, which may be energetic under favorable conditions, is of secondary importance in its therapeutic employment, because other currents are much more effective and free from objectionable features.

The static current, when not interrupted, is a constant current of very high voltage, and from Holtz machines of very small amperage, approximately an average amperage of from $\frac{1}{4}$ to 1 milliampere, varying with the number of revolving

plates and the speed of the machine, and a potential of from 100,000 to 800,000 volts and more. The sensible effects of the static current, when *not interrupted*, are practically *nil*, the current flow being so small that thermic and electrolytic effects are inconsiderable, and perceptible mechanical effects are absent, except that when the patient is insulated the hair stands erect. If, however, the static current is *interrupted* and regulated to a rate of interruption below 600 per minute, it produces marked contractions alternating with release, and with less annoyance or irritation than currents from any other electrical source. In the resulting mechanical effects upon the tissues, the static current when regulated and properly administered is capable of producing successive contractions of the muscle fibers individually and *en masse*, thereby expressing infiltration and softening and reducing swelling when present in indurated tissues, coincidentally increasing local and general metabolism.

Electric currents derived from Rhumkorff coils, when of very slow rate of interruption, are capable of producing similar effects, but in no sense duplicate in scope or control the static currents, and owing to greater amperage and other conditions are more disagreeable to the patient.

The current from the *large coils*, which are constructed for use with the Roentgen ray, are provided with current-breaking devices, which interrupt the current at a very rapid rate. The currents from these coils produce a stinging, cauterant effect, devoid of the characteristic type of contractions produced by the static current.

The sinusoidal current, alternating in character, produces but slight electrolytic effect, because the alternations, changing the polarity in equal quantities neutralize each other. The local effects of this current are principally mechanical, and, to a degree, thermic, but in neither of these actions are they so effective, either as to the thermic effects produced with the high frequency d'Arsonval current or the mechanical effects of the static current. There are, hence, few, if any, conditions in which this current replaces or compares with the distinctive effects of the static or high frequency currents in therapeutics. It is useful, however, for limited local applications, and for use by the physician who has not sufficient place for static and high frequency apparatus, or for those who are not familiar with their employment.

The high frequency currents, the most efficient of which is the d'Arsonval current, produce no electrolytic effect whatever. This is demonstrated by placing the opposite poles in a solution of iodide of potash and passing a large current through the K I solution, when no decomposition takes place, as would be indicated by change in color of the solution.

The thermic effects of the high frequency currents are more marked than from any other source of electrical energy. This heat-producing action is in excess of the actual effect that would be derived from a constant current of the same current strength or amperage and without electrolysis. The thermic action is derived, as previously stated, from resistance to the currents and the effects of high frequency oscillations in setting up added vibrations in the tissues or other substances through or over which they pass. The direct d'Arsonval method is the high frequency current usually chosen for the induction of thermic effects.

The physiological effect upon the heated tissues through which the current passes between two electrodes placed upon opposing surfaces is derived from the increased flow of blood at normal temperature to the tissues—the natural response of the vaso-motor mechanism to maintain an equilibrium of temperature. The blood becomes heated in passage, carrying away the excess of heat and thereby preventing burning of the tissues. In effect hyperemia is induced in the heated path of the current, and may be carried to a marked degree. The fixed tissue becoming heated, the hyperemia will persist with its beneficial effects for considerable time—until the circulating blood has cooled the tissues to normal. Applied in this manner, *the beneficial effects of local hyperemia so induced* are increased nutrition, increased metabolism, and an increase in the number of phagocytes that are thus induced into the tissues.

Imperceptible *mechanical effects* of the high frequency currents upon the cell bodies are effected, which are due both to the thermic action, which increases the activities of the tissues through the mechanical actions derived from the increased rapidity of tissue oscillation molecular in character and the increased volume of the blood stream, and also to the passage to and fro through the tissues of the actively moving electrons, the same as occurs in connection with the mechan-

ical actions due to the passage of the electrons with the static current. It is this action, together with the thermic action, that accounts for the distinctive effects upon metabolism and the arterial relaxation with lowering of blood pressure.

The physiological effects of electric currents from other apparatus resemble in varying degrees the effects of the currents described, but with valuable and distinctive action.

The mechanical effects of electrical currents may, therefore, be properly divided into the gross or sensible effects which are the local effects, at the site where the current passes in or out, or, as in the case of the static wave current, in *and* out of the tissues, and (2) to the effects due to the passage through the tissues of the electrons.

The perceptible mechanical effects of electrical currents are induced by make and break of contact with the tissues, as by the interrupted administration of sparks or convective discharges, or by interrupting the current in the circuit when the electrodes are in contact with the skin or mucous membrane. These effects are associated with muscular contraction, and the contraction of other cells which respond to electrical stimulation, by direct contraction of the tissues, or contractions induced by nerve stimulation, as by the application of electrical currents to motor points, or indirectly to the nerve trunks or branches.

It will be seen, therefore, that in the selection of electrical modalities for the various effects sought to be obtained in therapeutics we naturally choose the one best suited to relieve each condition respectively.

The only current capable of electrolytic action is the constant current. This current from a rational point of view has been longest understood with reference to its distinctive qualities of polar action. The inter-polar effects depend upon the strength of the current and the variations of resistances in the circuit. When strong currents are used the inter-polar effects must be largely thermic, and if beneficial are probably largely due to the induction of hyperemia at the surface and in the path of the current.

If we were able to determine the exact depth and direction of the local action of this current and eliminate a possibility of disturbance from local polar action, we might with greater safety employ it for the interpolar thermic effect for the pur-

pose of inducing local hyperemia. The constant current, however, is one of so low voltage that its direction of passage follows, as it must, conductors of the least resistance. Its effects that are demonstrable and practical seem, therefore, to be limited to electrolysis or derived from peripheral stimulation, due to the superficial, irritating effects of the current, as previously stated. We do not, for this reason, naturally elect this current for other than its polar effects; because other currents produce the mechanical and thermic effects in a manner which may be definitely demonstrated and understood.

The static current—a constant current of high potential—passes readily through the skin, directly to the muscle fibers wherever application is made with an interrupted current, as of the static wave current, static induced current or the static sparks, producing direct responses regardless of the proximity of the nerve to the surface and without reference to motor points. This is demonstrable by promiscuous application, and produces results in draining indurated tissues and relaxing muscular spasm. No current from other sources is capable of producing to the same extent the valuable mechanical effects of the interrupted static current when applied to extensive areas for the relief of pressure or pain, or for its effects upon local and general metabolism.

It is readily demonstrated that the electrical impulse is distinctly different from the nerve impulse, its velocity being millions of times greater than the velocity of the latter. When we exercise a part by an interrupted static current, the responses are undoubtedly due to irritability of the muscular structures, independent of the nervous mechanism. As previously stated, with a current of such small quantity the electrolytic action is practically *nil*, which renders its local effects with reference to electrolysis unobjectionable under all conditions.

The sinusoidal and induced currents are used also for their mechanical effects, wherein they possess no advantage over the static wave current, but fall far short in range and are devoid of the beneficial constitutional effects. In the writer's experience, if other currents are applied for their mechanical effects with the same intent, it is impossible to discover the same degree of advantage to be derived from these lesser currents, providing the relief from pain or improvement of nutrition and metabolism is what is sought.

The various expressions of opinions as to the preference for this current or that current without the demonstration of physiological reasons for such preferences is certain to lead to confusion in the minds of students or beginners. To avoid such confusion they must be led to look at the subject of current action from a definite point of view, with reference to the physical qualities of each current and the consequent physiological effects produced by them.

Considered from the only rational point of view, that which is based upon cause and effect, there are different ways, I grant, of accomplishing the same result. This is particularly true of the *electro-destructive* methods. For example, one operator will destroy a malignant growth or neoplasm with dessication, another with electrolysis, another with destructive fulguration, another with the x-ray, another by the method of Doyon, and still another by the knife followed by fulguration. Each has its advantages which may better adapt one to peculiar conditions than another, though much will here depend upon the greater skill and experience any operator has acquired with the method with which he is most familiar.

In the uses of electricity by the physician or internist, there is less scope for variation in technique if the same results are to be obtained.

For the removal of induration associated with infiltration for the relief of pain and restoration of local metabolism, where no infection is present the static current holds the field pre-eminent, and also for the relief of local muscular spasm. No agent known will so effectually relieve the swelling and pain of an acute trauma or reduce an enlarged prostate, or a congested or cirrhotic liver, or a malarial spleen, or any similar infiltrated enlargement as the static current. Nor will any other so often and so certainly relieve the pain and cure the various cases of local neuritis as the mechanical acting static modalities.

For the treatment of *defective metabolism*, associated with conditions of inertia and arrested function, the static modalities and the high frequency current are both indicated. In certain conditions one answering the purpose better than the other.

For lowering blood pressure there is no modality to be considered or compared in efficiency with the d'Arsonval high

frequency current, particularly by the auto-condensation method.

For thermic effects, for the purpose of inducing hyperemia with its beneficial effects on local metabolism, local nutrition and for the induction of increased local phagocytosis no other current should be considered except the apparatus is not at hand. The constant current can never be considered a peer for use in this particular.

When, however, an agent is required for localized electrolysis or ionization, no other current is to be considered in this connection but the constant current, for no other current will meet these indications. There are undoubtedly many things that can be done with the constant current for other conditions than those referred to, and in which it may be indicated in the hands of those who have developed a special technique, but there is no current so dangerous in the hands of a novice as the constant current.

The election of electrical modalities or currents producing distinctive effects, to meet the different therapeutic indications, is rendered definite when the peculiar action and physiological effect of each is understood and not otherwise.

The tyro or presuming individual, be he physician or quack, who essays to employ electricity for the treatment of a patient, except intelligently, with a definite understanding of the modality and condition upon which he employs it, cannot expect to accomplish a definite result, and may do serious harm to the sufferer, and bring discredit not only upon himself but upon electro-therapeutics. I mention this because hundreds of physicians and others are now doing this very thing.

It should be a generally recognized fact that in *electricity* the medical profession possesses the greatest of therapeutic agents, an agent characterized by conditions which constitute numerous modalities, each producing already demonstrated effects which must be known to be employed, as scientific men do things with benefit and not injury to their patients, and which will bring credit and not dishonor upon themselves.

Furthermore, let men who now assume to write for the advancement of the science of electro-therapeutics avoid as far as possible the empiric trend, and make as clear as possible to the reader or student the rationale of methods considered.

Discussion.

Dr. G. Betton Massey, of Philadelphia: This has been a very interesting paper, and I feel that it does not need discussion at all, other than commendation for its unusually clear exposition, excepting possibly in one point that I will come to in a moment.

The novelty of Dr. Snow's work is to me most distinct in his clear conception of the mechanical explanation of a good deal of electro-therapeutics. This explains a great deal of our work, and is rather a stimulus to its development.

The slight point of omission that occurred to me in listening was a little failure to accentuate what I might call physiological stimulation by the galvanic current. That, by the way, is unique with the galvanic current. I allude to stimulation of the special senses. You know one to three milliamperes applied or interrupted suddenly anywhere around the face, or a little more current a little further down on the neck, will give rise to two physiological responses. One is the response of the retina; you will see a flash on the interruption, the sudden application or the sudden withdrawal of the current. Another interesting fact is that the organ of taste is only brought into action by the galvanic current; in other words a current of sufficient amperage for that purpose. One of the values of the sinusoidal current as produced by some machines is the association of a varying galvanic current, giving you that possibility. This is a physiological response, not in any sense a mechanical one. Books have been written on these responses, particularly by the Austrians. While it is possible that, in their ultimate analysis, these responses are caused by electrolytic alterations of the centripetal nerves, we do not yet know that it is so. So that to speak of electrolysis in its gross sense as the *modus operandi* of the constant current rather overlooks the basis of physiological stimulation of the organs of the body through reflex action. It should be understood that the galvanic taste, the galvanic flash, and to a less extent the galvanic sounds in the ear are not direct stimuli but reflex. I demonstrated that as early as 1884, when the matter was still under question, in a patient of Dr. Weir Mitchell, in a spot on the forehead that was profoundly anesthetic. It was then a question among the neurologists whether the flash in the eye produced by the galvanic interruption was due to a direct stimulus to the retina or to a reflex action, requiring an intact reflex arc. In that case it was clearly demonstrated with an anesthetic area about the size of a dollar that it was necessary to have an integrity of the sensory nerve in order to have that response, and the same was true with the electrical taste. No matter how strong the current was made, with both poles on the anesthetic area of the forehead, there was no response to either taste, touch and I think hearing. But as

soon as we got outside of that area they all three appeared. The practical bearing of these facts is not only in that neglected field of treatment of the disorders of the special senses, but also to disorders of the abdominal organs, for instance; for with a varying galvanic current we may stimulate the production of the juices of the abdomen, the many glandular secretions of this cavity. We have a great deal to consider in the abdomen besides the mechanical action.

Dr. Frank A. Davis, of Boston: I listened with a good deal of interest to Dr. Snow's paper. He covered the whole general field of electro-therapeutics, but much to my surprise Dr. Snow treated the galvanic current with considerable respect. Usually he does not. He speaks of the three effects of electricity—the electrolytic, the thermic and the mechanical. As far as I know, the galvanic current is the only current which is capable of producing all of these three effects, unless it is the static wave current, and this current will not produce electrolytic effects. The galvanic is the only one that will do this. The direct current will not do it except when interrupted; then you get the three effects. Dr. Snow says that there is not much hyperemia produced by the galvanic current. To this I shall have to take strong and decided objection. I think any man who has used the direct current a good deal will bear me out in the statement that when a pole is applied locally there will be a high state of hyperemia produced. Not only that, but there is a decided raising of the temperature between the two poles.

Another thing that strikes me as I listen to the older men—men of the longest experience in electro-therapeutics, such men as Dr. Pitcher, Dr. Bishop, Dr. Massey and Dr. Morse, is the decided respect with which they treat the galvanic current on all occasions. I imagine that their experience in the earlier days was something like mine later on. In those days the galvanic batteries were the best and sometimes about the only thing at their command, and as a result they familiarized themselves thoroughly with the workings of that apparatus, and later on when I took up the work I first put in a galvanic apparatus, and that was all I had to work with, and I used it on cells, which I believe give better results than the street current; it is a more even flowing current and less irritating. These men always treat this current with the most profound respect, and the older writers in electro-therapeutics, such as Apostoli and Rockwell, the old war horses, so to speak, all speak of it and treat it with the most profound respect; and I believe, gentlemen, that if we give more attention to the galvanic current, and less to theoretical electro-therapeutics, we will all be better electro-therapeutists, and there will be less chance of criticism coming from men such as Dr. Bassler spoke of here to-day.

That brings me to another subject, the question of the so-called auto-condensation, which to my mind is a monstrosity in electro-therapeutic nomenclature, because it does not convey what the term implies. There is nothing self induced; it is a *thermo-condensation* method of treatment. Heat is produced, and the patient acts as a condenser. The name should be thermo-condensation to be strictly scientific. Dr. Snow speaks about this method as being the best for high blood pressure. Here we come back to Dr. Bassler's idea of practicing medicine from a scientific point of view. What is the cause of high blood pressure? Is it due to hardening of the arteries, or is it due, as it frequently is, to a compensatory condition of the heart? If we have got a high blood pressure due to a compensatory condition of the heart, we have got to be very careful how we use the high frequency current, because we will get a back pressure on the heart and cause physical discomfort and harm. I have seen this frequently in older people, and when that condition occurs one needs to take warning and get away from the high frequency current, or else use it very mildly and at infrequent intervals. In such cases as these we find that a great many times in older people that the positive static insulation comes in and gives them the tonic without the depressing effects. There you come back to the thorough scientific study side of the case. Find out what the trouble is; find out if the kidneys are involved; find out if the heart is laboring under valvular insufficiency; and in all these cases if we will make a thorough physical examination and a thorough laboratory examination where it is necessary, then after we have found out as nearly as we can what is the matter with the patient, then let us talk about modalities, and not until then. When we do this, gentlemen, we are on a scientific basis, and the internists, the surgeons, or any other class of practitioners can find no fault with us, and they will work with us. I have never had any trouble in working with the scientific men in Boston, and Dr. Granger will tell you he has never had any trouble. It is only because a great deal that is written and sent forth on electro-therapeutics is the most inane sort of stuff that discredit is given to this work. When we get at this subject from a strictly scientific point of view we will have no trouble with the profession, and we will get a section in the A. M. A.

Dr. Francis B. Bishop, of Washington: I have listened with intense interest to the valuable paper of Dr. Snow, but he makes so many important points in the paper that it is a pretty hard matter to follow him. In speaking of the direct current particularly, he emphasizes the fact that we get no hyperemic effect from it. That I think is a mistake, but it has been answered by Dr. Davis.

In the matter of lowering blood pressure, I have frequently

lowered the blood pressure with the direct current, and I have done this, apparently, by inhibiting the action of the sympathetic nerves through the pneumogastriacs. This method seems to be particularly adapted to those cases where there is hypertrophy with beginning dilatation of the heart.

So far as the static current is concerned, the doctor says that we get no electrolytic action from the static current. Perhaps we do not. Yet I have been informed by able physicists that we do get electrolytic action from the static current, to the extent that electroplating has been performed. The electrolytic action is very small indeed. But I believe that we do get a little. We know very well that after treating cases with the static current where the elimination is scanty, that we very often increase the elimination. This, I believe, is produced by some electrolytic or chemical action taking place in the tissues. If we do not directly by the static current produce a chemical effect, we produce it by stimulating the muscular and nerve currents normal to the tissues. In that way we get a chemical effect through mechanical action.

One thing I would like to say, that the facts relating to the galvanic current are facts a great many of them over a hundred years of age. They are as important to-day as they were over a hundred years ago, when Faraday made his discovery of the electrolytic action of the galvanic current. All those facts are just as true as they have ever been, and are just as adaptable to our methods of treatment.

Dr. W. W. Wilkinson, of Phoenix, Ariz.: It is rather a presumption for a tyro like myself to attempt to discuss Dr. Snow's paper. However, there are one or two things that I would like to present. In regard to the galvanic current, the point which Dr. Massey made I think is well taken. It has a peculiar effect. The point Dr. Bishop has made in regard to lowering blood pressure will be illustrated by the following case: Four years ago my father, a man seventy-four years of age, came to visit me in the Rocky Mountains at an elevation of nearly two miles. Some few years before that he had been up there, and the elevation had agreed with him. So I allowed him to come this time. Inside of a few days he was in a very critical condition. His respiration was rapid, his blood pressure was high, his circulation was poor, he was quite cyanotic, coughing frequently from an aggravated chronic bronchitis, and I was very much concerned. I applied the positive pole over the lower cervical and dorsal vertebrae, and a large dispersion pad from the negative pole over the abdomen. I gave him about thirty milliamperes for twenty minutes. Inside of ten minutes his respiration was slower, the veins were less prominent, his color had improved, and he was more comfortable. He had not been sleeping. That night he slept well, except that he had to make three special trips to the

lavatory, and the following morning he was in very good condition. It lowered the blood pressure, relieved the cough and dyspnoea, increased the serum and circulation in the abdominal viscera, and brought about all these results. It was the most striking illustration of the value of the galvanic current that I have even seen. I have used it a great deal in pelvic and other conditions, but this illustrates as well as any one case I know of the two points in regard to the galvanic current.

Now, if I mistake not, Dr. Snow did not touch on the x-ray. The fact that the rays will inhibit the activity of spermatozoa is well known. It seems to me that the x-ray has three peculiar, very strong therapeutic uses, that of sterilization or inhibiting germs, which of course applies to all forms of infection, and is of special interest to those who are treating tuberculosis. If you can stop the reproduction of germs, nature will soon take care of those you have on hand. Then the inhibition of overactive organs or tissues, such as hyperthyroidism and menorrhagia. Here the proper dose inhibits the cells just as it acts in inhibiting germs. And then its absorptive power or destruction of low grade tissue. The raying of a fibroid where you have the uterus bound down. I am told that after such a course of raying you will find the pelvic organs thoroughly liberated and free. Wherever you have adhesions a thorough course of raying will cause absorption of the adhesions. The dose that is a tonic to normal tissues will inhibit germs and overactive tissue and destroy low grade tissue. Those three points in regard to the therapeutic value of the x-ray, it seems to me, need to be kept in mind.

Dr. Frank B. Granger, of Boston: I was very much interested in the paper, and particularly in the physiological side. There were two or three points there that have been touched on, and one or two that have not. It seems to me that the results that were obtained in past years, particularly in nervous conditions, with the galvanic current, that the improvement in metabolism, the improvement in bodily weight, the return of appetite, the increase in the secretions obtained by a general galvanization, something which has fallen more or less into disuse at the present time, because of the disagreeableness of the operation, the fact that the patient has to undress, the fact that it requires personal attention, more than you get with the high frequency or the static machine, and the greater ease with which the other currents can be employed—it seems to me that the results that we have obtained by the more modern methods.

In the second place, in regard to the sinusoidal current (I have two static machines, and I use them a great deal), but for certain conditions, such as cases of constipation, in cases where we want to improve the musculature, in my experience

there is nothing that is more beneficial to the patient than the sinusoidal current, and the reason for this is plain. We have in the sinusoidal current a means of stimulating the normal physiological contraction of the muscle. A contraction of a muscle produced by the sinusoidal current is practically the bellying up of the muscle, which is the same as the sine wave. In no other current that I know of can you so absolutely present this muscular contraction. With the galvanic we get a sharp contraction. With the faradic current we get an irregular, sharp contraction. With the wave current we have what more nearly approaches the sinusoidal than any other in the line of contraction. I have often felt that, as much as I value and use static electricity, if I were obliged to be confined to one current only, I should use galvanism.

Dr. Arthur W. Yale, of Philadelphia: I would like to emphasize the regenerative power. If our motto is regeneration and not extirpation, then with the static modalities we have a most efficient means of general recuperation. I believe this is done very largely, in a long continued series of treatments, by the absorption of the loose molecules of oxygen through the capillaries. In the wave current a large amount of so-called ozone is collected on the surface of the body. Whether this is ozone, or whether the O_3 molecule is simply broken up and we have O_2 and O and the O is absorbed, we cannot absolutely so far ascertain. But that loose molecule of oxygen being absorbed by the tissues and carried around by the blood current causes an elimination of waste by oxidizing that waste in the cell and its carrying off through the eliminative channels. I think that is a very important point in that modality which cannot be produced by any other current.

Dr. Herbert F. Pitcher, of Haverhill, Mass.: I think we will all concede that Dr. Snow is a master of the static current. In his technique and his long experience in the use of the static current I think he can really do what no other man can.

He spoke of using the static current in acute neuritis. I would like to say, and I am not alone in saying it, that in acute neuritis the condition has been aggravated by the static current sometimes, especially in neuritis of the sciatic nerve and in cervico-brachial neuritis. I know that Dr. Snow gets excellent results from that current, but it is due to his technique, and it is my fault that I sometimes get a disastrous result.

I think the sinusoidal current is of the greatest advantage in the treatment of pelvic conditions, especially in atonic conditions, for the reason that you can get a deeper painless contraction, whereas the static wave current causes a spasmodic contraction of those muscles without going the depth that you can with the sinusoidal. With one pole applied to the nerve centers, and the other in the vagina, you get stimulation of

the nerve centers that you do not with the static wave current.

So much has been said on the continuous or galvanic current that it hardly needs any repetition, but in the after effects of hemiplegia there isn't any other treatment that will take the place of the continuous current in the lack of mentality and the want of action after the effects of the shock. Especially is this true in cases where there is a loss of memory. Their thoughts are confused, they cannot say what they really intend to, they have dizziness, and headache of a neuralgic character. In these cases many times you cannot use your d'Arsonval current, because there are conditions of the heart and kidneys that forbid; but you will find that by placing the negative pole on the forehead and the positive pole back of the neck that you will get almost immediate effects. Often with one treatment you will see an improvement. I usually begin with five milliamperes, and gradually increase the current. I had rather give a small current for a long duration and get the ionizing or tonic effect upon the nerve centers. You can readily give—with a large electrode reaching across the forehead over onto the temples—for the negative pole and a very large electrode for the positive, covering the back of the neck and down the spine, you can use quite large current strengths, from ten to even twenty-five milliamperes after a while, but at first it is better to use a very mild current, because they feel a little giddiness and observe the flashes. But I never have seen any harm in using a large current after they have taken the treatment for some two or three weeks. It is seldom that I give over ten milliamperes, but I have given larger doses with the larger electrodes. It is usually of more benefit in the old cases, from three to six months or longer after the attack. It will lower the blood pressure if you give the treatment long enough. For that purpose it should be given for twenty minutes or more with a low current, ten milliamperes or less.

Dr. George I. Forbes, of Burlington, Vt.: Emphasizing what Dr. Snow said concerning the fact that we must treat our patients and ascertain the cause, I have treated a great many cases of neuritis, using the static wave current. I will mention just one case in particular that I was unable to treat. I made her worse every time I gave the treatment. She could not stand a spark gap of a quarter of an inch without making her faint. I tried for a long time and gave it up. I tried the high frequency, and it made her ache severely, and I could not use that. It was only when I found that there was a lesion in the pelvis and began to treat that that I was able to use the static wave current over the shoulder, and she has improved steadily. The introduction of the vaginal electrodes in that case, unless done with great care, would immediately start that shoulder to ache.

Dr. Mary Arnold Snow, of New York: In regard to the lowering of the blood pressure by these different methods, in our office we lower it mostly by the d'Arsonval current, or by vibration, but it seems to me that it is not so much a question of modality as it is a question of where the electrodes are applied, for blood pressure may be reduced by cardiac inhibition affecting the vagus when it will fall suddenly, as has been demonstrated, or if the depressors are affected the fall will be gradual. This is believed by Foster. If the heart beat is not markedly changed with a lowered blood pressure he believes that possibly certain areas as that are governed by the splanchnics are affected. I believe that when Dr. Pitcher applied the electrodes as he described he affected the posterior pituitary body, and in that way affected the adrenals and affected nutrition and obtained dilatation. In regard to his treatment of neuritis, it has been my observation that if we use the static current too strong that the condition will be aggravated.

Dr. Snow: I regret that the real subject of my paper has not received consideration in discussion. The constant current has been the burden of the discussion. My paper was directed to the more scientific consideration of electricity in therapeutics. In other words, in considering the indications for treatment, we set aside all prejudices and use the various modalities from a purely scientific point of view. I have no objection whatever to what has been said about the constant current. I stated very emphatically in my paper that there were various uses of the constant current in the hands of those who were familiar with it, but that there were general principles for the beginner which did not include it; and furthermore, that a better understanding of other modalities by those who constantly bring up the constant current would change their sentiments. I made my statements with reference to the relative value and special indications for each. I think it is a great mistake for so much confusion to exist in the minds of the members of the profession, who should know that the beginners in the subject of electro-therapeutics are certain to be misled thereby. These lesser conditions in which a current may be applicable have nothing to do with the establishment of general principles of indication. It is the broader understanding of the subject that I have considered in my paper from the point of view of these distinctly different physical and physiological effects—the thermic, the electrolytic, and the mechanical. We must consider them so if we are to teach and understand the subject intelligently from a scientific point of view. How, when and why are the things to know and to teach. Diagnosis must be included, for “why” must include the effect to be obtained and what we are doing it for.

A short paper could not embrace a reference to all subjects, but my effort in this paper was to urge a consideration of the

specific actions and effects of the principal electrical modalities. I did not say that the constant current did not produce hyperemia. I said it produced less hyperemia than the high frequency current and with a detrimental electrolytic action. I used the constant current and induced currents constantly for twelve years before I used other more modern modalities. My experience was with the constant current first of all, and I knew how to use it. That is one reason that I do not wish to be considered as being unfamiliar with the constant current. I believe in it still for electrolysis, but for other effects the other methods are superior. The effects to which Dr. Massey refers are effects producing stimulation. If there is a taste there is electrolysis, which is to be avoided when not indicated.

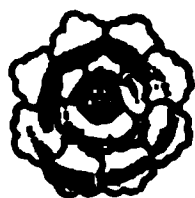
The question as to the application of any current is whether it will cure the condition under consideration. We use electricity for therapeutic purposes, and if we are treating a condition we are treating it to give relief. In the abdominal tract if we alter the circulation, restore functional activity, so that the organs resume their normal function, that is all that is required. If the static current or the sinusoidal current in its mechanical action accomplishes this, it is due to the mechanical effect and not to electrolysis.

The effects of hyperemia is one of the greatest subjects in therapeutics; one which places the high frequency current in a prominent field. We can with it localize and control the extent of hyperemia to a nicety.

The term "auto-condensation" originated with Prof. d'Arsonval, and its use is world-wide with reference to the treatment of hypertension. Dr. Davis' implication was practically that a man who uses the high frequency current for lowering blood pressure is going contrary to the indicated treatment. His statement concerning cardiac compensation is very vague. He referred to cases of cardiac insufficiency. I want to know if relief of high blood pressure is not a benefit in such a case; when it certainly aggravates the condition of mitral insufficiency? There is no class of cases that get greater relief by taking off the extra load of arterial hypertension than cases of valvular insufficiency. I have a young child under my care now who came to me with a pressure of 128 m.m., a child of only fourteen, and with an incompetent mitral valve. The improvement since reduction of the pressure is remarkable. The pressure and tension was caused by auto-intoxication, and diet, relief of constipation and restoration of the liver condition was the treatment; but pending restoration auto-condensation afforded prompt relief. The heart will compensate and force the current through, but when we take off the burden of resistance by relaxing the tense arteries, the work of the heart will be relieved. With a blood pressure of 220 m.m., there will be a compensation point way below that high point. Re-

duce the pressure to that point and the pending danger of apoplexy is removed. I am treating a case of cirrhosis of the liver who came with a pressure of 240 mm. I have not reduced it below 180. His liver, which extended down in the iliac region, is reduced nearly to the rib line, whereas at first it almost filled one side of the abdominal cavity. The lowering of the pressure to 180 left the blood pressure adequate to drive the blood through the liver, and his improvement was progressive. All phases of every case must be taken into consideration, and every method must be intelligently employed by those who understand both the pathological conditions, the indications, as well as the effects of the method or methods employed.

By the rational, scientific use of electricity I am sure that more uniform results could be obtained by those who employ electro-therapeutics. The fact that a modality was used should still be used, instead of the things that give better results, is contrary to reason, against progress, and rather a reflection on those who are not willing to keep pace with the onward trend.



ELECTRICAL MASSAGE.*

BY DR. C. O. FILES, PORTLAND, ME.

We often use the expression "*Vis medicatrix naturæ*" without realizing the extensive application of the power to almost every form of disease. There was a time when we thought we healed a wound by applying certain therapeutic agents which we supposed had the specific power of causing union of the separated parts. We once believed that blood letting, mercury, tartar emetic were efficient means of curing disease. We now find that if we guide the "healing power of nature," and overcome the antagonistic forces which prevent nature from doing its work, the patients for the most part get well. Every organ, every tissue, every cell of the body requires constant contact with fresh arterial blood in order to preserve its integrity. The underlying cause of most diseases is starvation of the tissues from a slowing down of the circulation or from poverty of the circulating fluid. This latter condition is caused either by circulatory insufficiency of the digestive organs or by taking too little or too much food, or, as we may say, by errors of diet. The truth of these statements is proved by the remarkable results obtained by the employment, in very many forms of disease, of physical therapeutics. We cannot truthfully say that electricity, vibration, light, water or massage cure diseases. They assist the nutrition, restore normal circulation, give tone to the nervous system, have an inhibitory action on various bacteria. In other words, they remove the obstacles to a restoration to health, which the power of nature might or might not be able to accomplish. The result of the action of these physical forces, in a general way, is very similar. One physician will pin his faith to one mode, another to another mode, and yet the outcome will be very similar. This statement does not indicate that all cases could be equally well treated by any one of these forces. Indeed, the careful study of each case will force the physician to the conclusion that some one of these modes is peculiarly adapted to that particular case, although good results will follow any one of these modes. Many of our older

* Read at the Twenty-third Annual Meeting of the American Electro-Therapeutic Association, held in New York City, September 2, 3, and 4, 1913.

members will remember a remarkable paper read a few years ago by the late Professor Herdman, in which he contended that we were neglecting the constant current. He showed that many diseased conditions, for which we generally use static electricity, the x-ray, or the high frequency current, could be treated quite as successfully by the constant current. Massage has long been considered a very valuable adjuvant in the treatment of many diseases. Very few physicians have realized that in electrical massage, by means of the hand of the operator, the value of the massage is vastly intensified, and the field for its use greatly broadened. In the anemic condition, introducing many wasting diseases, this modality has proved its efficacy. Static electricity has been very successful in this class of cases, but electrical massage secures speedier and more brilliant results. It is not necessary to explain in detail the physiological action of this combination of electricity and massage. We can readily follow out that action by what we know of the action of electricity and massage. Imperfect aeration of the blood is one of the chief obstacles to overcome in the treatment of tuberculosis. This is due to impairment of the air cells from the disease itself; to impure air, deficient in oxygen and impregnated with carbonic acid, and very largely to weakness of the muscles engaged in the process of respiration. It requires the expenditure of a large amount of force to lift the walls of the chest sufficiently for a requisite inspiration eighteen times a minute. One of the earliest symptoms of tuberculosis is a loss of weight, disappearance of fat, and muscular weakness. Any muscle may be enlarged and strengthened by the use of an electric current, by massage, by vibration, and especially by electrical massage. After a thorough treatment of the muscles of respiration by electrical massage, the breathing becomes deeper and easier. Muscular weakness also retards the circulation throughout the body. This retardation in turn increases the muscular weakness. There is no form of electricity that can compare with electrical massage in hastening circulation and giving strength to muscles. If complete rest is enjoined and the passive treatment of the muscles practiced, more will be done for the patient than can be accomplished by any other means.

April, 1894, Miss C., 24 years old, gave a history of one attack of pneumonia and several attacks of severe bronchitis.

Her father died of tuberculosis when she was a child. The previous fall I had advised her to spend the winter in the South. She was in Atlanta until April, when she came North. On arriving in Boston she was taken sick with her usual bronchitis, and high fever. She pluckily came through to her home in Portland and went to bed. She took the usual treatment in such cases. The prostration and emaciation seemed alarming, and I concluded to try electricity. She could not come to my office, of course, so I took a small Faradic battery to her bedside. She took one electrode in her hand. I held the other in one hand, and with the other slowly massaged her limbs in the direction of the venous circulation for about fifteen minutes. Then I massaged the body, especially over the lungs, for another ten minutes. Her breathing improved immediately and she said the treatment seemed very helpful. This treatment was continued for a week at her home, and afterwards at my office for nearly three months. From the very first the improvement was rapid and continued without any relapse. She resumed her work as a newspaper reporter within a month, and at the present time considers herself perfectly well.

Case 2. Mrs. H., aged 60 years, has been an invalid nearly all her life, although having a slight excess of adipose tissue. Has had rheumatic arthritis, pneumonia, ovaritis, endocarditis and biliary calculi. Has been my patient for about twenty-five years. During my absence in Europe, in 1910, she became very ill and was hurried to the hospital for an operation for gall stones. Owing to her physical condition the surgeons refused to operate, thinking she could live only a short time. On my return she was brought to my office by her husband and son in order to have a radiograph taken of the gall bladder. This was not necessary, as the gall bladder could easily be recognized by palpation, as a "bag of nuts." She had great faith that electricity would help her, as it had in other serious conditions. She had suffered so much pain and taken so much morphine that she was unable to walk without assistance. It did not seem possible to accomplish much by electrical treatment. However, to please her, I gave her a few treatments with the brush discharge over the affected area. This proving somewhat beneficial, I thought I would try a gentle electric massage. The leucodescent light was also employed as strongly and as long as she could bear it. Of her own

accord she made a daily examination of her faeces, and told me she had counted several hundred small calculi. At any rate the gall bladder has resumed its normal size. Electrical massage, the leucodescent light and vibration were kept up daily, with few exceptions, for three or four months, and then once or twice a week for several months more. At the present time she enjoys fair health, does her own housework, and goes about as well as she has been at any time for the last ten or fifteen years.

I could report many cases where electrical massage has accomplished more than could be expected of any other form of electricity. There has been very little written on this subject, and I have never heard of its use in wasting diseases. In tuberculosis we require the patients to take absolute rest, a large amount of concentrated food and plenty of fresh air. We forget, however, that fresh air can only be obtained by respiration, and that food will not strengthen the respiratory muscles without exercise of those muscles. By the passive electrical massage of those muscles we accomplish as much as we do by forced feeding and fresh air.

Discussion.

Dr. Alice B. Condit, of Orange, N. J.: I would like to ask what variety of machine is used. Is it a Faradic or sinusoidal? I did not catch that.

Dr. G. Betton Massey, of Philadelphia: I judge the doctor used the faradic current. We have here a modality about which nothing has been said, because a lot of us know nothing about it. I myself know nothing. I merely rise to say that the faradic current transferred from an electrode held in the hand, the patient holding the negative pole and the physician the positive, and with the other hand using light massage in the direction of the venous circulation, is something that I have heard of being used with a great deal of effect. I do not think it ought to be lightly treated; it might have its value, and doubtless does. It is a modality that should be investigated by those who wish to do so. Personally I do not care to make a massage man of myself, and never have.

There is one point I want to make. In the first lines of the paper I was reminded of a newspaper cartoon that I saw in a Minneapolis paper in June, on the occasion of the meeting of the American Medical Association. There was the old therapy and the new. The new therapy, a vigorous young doctor, with strong jaw and fat pocketbook, was running an automobile in which there were a lot of beautiful boxes with physical agencies with which you are all familiar. On the other hand, an old doctor, on an old decrepid horse, going over a precipice, with signs in his saddle bag of some of the most valuable

therapeutic agents, mercury, quinine, opium—things that will ever remain of inestimable value in the practice of medicine. I do not think we are casting discredit on such standbys in the practice of medicine if new modalities are properly introduced.

Dr. W. W. Wilkinson, of Phoenix, Ariz.: I should like to understand why we are particular about polarity in this case. I believe by using this modality, together with the static or direct d'Arsonval, we can get a liver back to normal condition and thereby secure normal bile and dissolve gall stones.

Dr. Herbert F. Pitcher, of Haverhill, Mass.: I have just used this method in a few cases where the patient was confined to the house, I think with benefit, but, of course, when I could get the patient to the office I used the usual modality. I think where it is impossible to treat the patient in any other way it is a very valuable method.

Dr. Frederic C. Tice, of Roanoke, Va.: The faradic current and the direct current were the only means we had some years ago of giving treatment at the bedside. I myself have known of cases of obstipation, cases diagnosed as ileus, satisfactorily treated with faradic massage; but in the cases I treat I use an electrode in the form of a glove, so that my hand would not absorb anything from the patient. I have seen cases of paralysis of the lower limbs from exposure to cold relieved by faradic massage. There has been a great deal of good work done with the faradic current, and the only reason I do not use it to-day is that I get better results with light and static massage.

Dr. Massey: Answering Dr. Wilkinson, there is a very great polarity in the faradic current. In the first place, the primary coil—which is not the coil used by the doctor at all—is an absolutely uni-directional current as delivered to the patient; only the direct inductions reach the patient; the indirect go back to the coils. By the construction of the high tension faradic coil, on the other hand, the secondary, while chemically balanced and equal at each pole, is very greatly different physiologically, on account of the slow rise of the induction that comes out of the positive pole, as contrasted with the quick rise at the negative. The idea of the doctor was to use only a high tension current; otherwise he would cramp his hands, using the hands dry. It is an extremely light current. The part of the patient is moist, and using the positive pole on the patient is the least exciting.

Dr. W. W. Wilkinson, of Phoenix, Ariz.: I should like to understand why we are afraid too much bile is used in this case. Also I believe by using this modality, static or direct d'Arsonval, we can get a liver back to normal condition, and thereby get normal bile and dissolve gallstones.

Progress in Physical Therapeutics.

GYNECOLOGY AND ELECTRO-CHEMICAL SURGERY.

EDITED BY G. BETTON MASSEY, M.D., PHILADELPHIA.

A Bipolar Experience. By A. S. Tuchler, M.D., San Francisco, Cal.

(Original communication.)

In order to promote absorption of any small growth, whether it be on the face, in the rectum or elsewhere, this modality will be of value, in that no scar will be left on the skin after its use and the mucous membrane will be perfectly smooth.

In order to obtain this result, a light current must be used, just enough so that the white foam appears on the negative needle, say about two m.a., and held there for a few minutes. A stronger current will cause sloughing, which is not desirable.

An elderly lady had a wart on her nose the size of a large pea. It was located on the anterior aspect of the organ, midway between the bridge and the end of the nose. It had been there for a long time and was looked upon as a beauty spot, until it showed signs of irritation accompanied by pain.

The unipolar method was used under cocaine anesthesia, the negative needle of the direct current was passed through the base of the growth until a white foam appeared, or about two m.a. for three minutes. After three such treatments without any change in the appearance of the wart, the bipolar iridio-platinum needles were inserted through the base of a portion of it, after using local anesthesia. The needles were left in position for three minutes, two ma. being used. It took three weeks to entirely absorb it, one treatment a week being given and the needles inserted in a different portion of the growth each time.

Absorption took place after each seance in the portion treated, and after the last application the nose became perfectly smooth, no sign of the growth nor of the needles being observable.

The bipolar needles used were made by the writer as follows:

To the ends of the two copper wires, six inches long, were soldered two iridio-platinum needles, one inch in length. Each copper wire was then shellaced and wrapped with thin rubber tissue, another coating of shellac being given, after which the two insulated wires were wrapped together with the rubber tissue, shellaced and finally wound with a narrow strip of

adhesive plaster and again shellaced. The proximal ends were cleaned off, bent slightly apart and a double connector attached to each wire. These electrodes can be made longer, so that they can be used through a speculum in treating cavities.

This bipolar method for the absorption of small growths or warts has been made use of by the writer for the last ten years, and is far preferable to the unipolar mode. There is no hemorrhage or sloughing following the treatment, and it will stop the bleeding from internal hemorrhoids.

[Comment by Editor: Dr. Tuchler's experience is interesting, and those of us employing electro-chemical minor surgery welcome practical tests of the comparative value of unipolar (negative) and bipolar electrolysis in the treatment of moles and similar benign surface neoplasms. In the matter of the comparative painlessness of the two methods, the advantage is with the bipolar method, *provided the two pole electrode remains unmoved during the application*. It would seem that a shorter electrode than the one described would produce better results from this point of view, the short electrode being readily held immovably in place after insertion by a guy strip of adhesive plaster. A piece of very light wire, say No. 34 B. & S. gauge, could be twisted about the end of each short platinum-iridium needle as conductors, the two needles being then fixed in proper relation with each other and at the desired distance apart by simply holding them at this distance over an alcohol flame and fusing sealing wax over them, except at the active tips. After use the platinum needles may be readily separated for future employment differently mounted.

The longer electrode described is most excellent for use in cavities, as stated by the essayist, similar instruments having been much used in my own practice. The shank would be more slender and more readily kept in an aseptic condition if the two shank wires are covered with sealing wax alone, fused on as described, their perfect separation from each other and proper insulation being secured by wrapping one wire with thread before covering the two with the fused wax. Such a bipolar electrode may be sterilized by flame before each application, and takes up very little room in a narrow cavity, permitting ready inspection of the field of application. Bipolar electrodes thus insulated with wrapped thread and covered with shellac have been employed by Dr. J. Solis-Cohen, of Philadelphia, in laryngological and pharyngeal work for years, the commuta-

tor's improvement consisting in the use of fused sealing wax or fused shellac rather than dissolved shellac as the covering.

Returning to the question of the comparative effect of negative puncture and bipolar puncture in benign surface neoplasms, it is possible that the bipolar method is at times more effective with similar current strengths, because it is more efficient in destroying the vascular supply. But in using the bipolar method there is greater chance also for the production of an unsightly scar.—G. B. M.]

HIGH FREQUENCY CURRENTS.

EDITED BY F. DE KRAFT, M.D.

High Tension, High Frequency Currents. By J. Herman Branth, M.D.

The doctor says that all those who have studied the science of electricity know that high tension electricity will urge metabolism into normal lines. All currents which will leap through an air space are high tension. A low tension current will be stopped by any poor conductor. Not so the high tension variety. The higher the tension the more positive the transmission in a straight line. Some years ago the speaker demonstrated that the extremely high tension current passes through every known insulator, either direct or by electric stress of opposite polarity, quantity also being obviously considered a factor.

The speaker describes his Tesla coil, an inverted coreless coil; the secondary inside, the primary outside. This is attached to the outside of a pair of Leyden jars, which are fed by a Toepler Holtz static machine having twelve revolving plates.

He utilizes a sparkgap mechanism of his own design and construction. It consists of a frame work having one rigid bar carrying seven brass spheres of one-half inch diameter. These spheres are mounted on insulation stems one and one-quarter inch apart. Parallel to this fixed row of spheres is an axle capable of rotation. This axle carries eight spheres similarly mounted, but so as to fit in between the spheres of the rigid bar. By rotation of the lower axle its spheres can be turned either toward or away from the fixed spheres, thus lengthening or shortening the sparkgaps. By shifting the connecting wires any number of gaps can be chosen. With this mechanism a low x-ray table, backing up a one-half to one inch vacuum, may be changed into one backing up from four to six inches, thus increasing the penetration. The

speaker says he was perhaps the first to learn this fact years ago.

With the apparatus described a very high voltage and a very high frequency is attained, so high that it is above the nerve register, muscular contraction is avoided and the patient will stand the application. "The application of a high tension high frequency vacuum tube will give pain only when applied to a diseased part; not so on a healthy surface." Such a vacuum tube applied to the surface of the body produces a feeling of pleasant warmth, and the surface becomes red like a scarlet fever patch. This lasts about three hours. The redness is due to dilatation of the capillaries, more blood is attracted to that region, which means increased phagocytosis. The writer calls it increased vitality of the tissue cells.

When this current is sent through an organ like the liver or kidney in subnormal condition it will help nature to overcome abnormal conditions, be it hepatic cirrhosis or what not, if the vitality is not too exhausted to bar repair.

In cases of arterio-sclerosis where the heart is tired out by constantly pushing the blood along the wire like unyielding vessels, receiving less and less help from the growing inelasticity of the vessel walls, relief should be expected from high frequency currents by the bipolar method. A man, aged 69, had chronic synovitis of both knee joints, also general arterio-sclerosis combined with alarming cardiac symptoms. High frequency currents were applied with the result of great improvement in his general health.

Dr. B. has combined x-ray treatment with the high frequency current in a case of recurrent sarcoma situated over the left lower ribs, causing marked rotation of the spine. Rapid reduction in the size of the tumor occurred. The doctor read this paper before the Medical Society of the Greater City of New York on January 20, 1913, and showed this patient, also a woman, who had had a large glandular tumor of the neck. The tumor seems to have disappeared. Only the shrunken thick wall remains. A woman was shown who had been suffering from ascites which necessitated the removal of from 16 to 26 pints of fluid every seven or eight days by tapping. The liver was reduced in size, and could not be palpated even after removal of the fluid. High frequency electricity was applied by the bipolar method. The woman has been well since May 11, 1912.

The doctor also cited a case of alcoholic enlargement of the liver. He had been tapped every twelve days and three and one-half gallons of fluid removed each time. High frequency currents were applied by the bipolar method, a metal ball electrode to the back and a glass vacuum electrode to the front of the liver. The intervals between tapplings grew longer and the quantity of fluid smaller. His last tapping was on No-

vember 5, 1911. Treatment was begun October 2, 1913. He remained well and strong until the end of December, 1912, when he contracted erysipelas and died December 30, 1913. No trace of the hepatic trouble was observable.

Experimental Studies of the Action of Electrical Cauterisation on Neoplasms. By J. Bentley Squier, M.D. Read at the Twenty-sixth Annual Meeting of the Am. Assoc. of G. U. Surgeons, June 8, 1913.

In this paper the results of studies on the action of the Oudin and bipolar d'Arsonval sparks upon malignant growths of the bladder and otherwise are detailed.

A gentleman 59 years of age had been in good health. Frequent urination developed. Shortly blood appeared in the urine associated with dysuria. The haematuria intermitted at first soon became continuous. In December, 1911, an able urologist cystoscoped the patient, and discovered a tumor occupying the right side of the bladder. Inspecting malignancy cystoscopic fulguration was attempted. After a number of attempts the treatment was discontinued, owing to the excessive bleeding, which interfered with the proper application of the treatment.

On February 6 S. opened the bladder suprapubically under anæsthesia. A growth which seemed limited to the mucous membrane in the fundus, while in the trigone the deeper structured were invaded, was found. After shelling out the tumor occupying the trigone and curetting the more superficial growth of the fundus, the bipolar spark was applied to the interior of the bladder wherever any growth had been. All hemorrhage ceased at once. The bladder and suprapubic were closed.

The patient seemed to bear the operation well. Histological examination of the tumor. Microscopic examination shows two types of carcinoma, one in which are small aveoli of carcinoma cells and the other in which are papillary tufts clothed with a mass of cells of cylindrical and flattened variety.

Diagnosis: Papillary carcinoma. At the end of five weeks the abdominal wounds were healed. The urine had been free from blood since the operation. Seven weeks after operation sudden death occurred from pulmonary embolism. The bladder was removed and sent to the pathologist. There was no microscopical evidence of carcinoma either in fundus or trigone. Histological reports: March 25, 1912. Certain portions of the bladder wall show total absence of mucous membrane, the submucous coat being very rich in vessels and diffusely inflamed. Other sections show inflammatory involvement of fat and of the serous coat; total absence of mucosa, the submucosa being necrotic. Other better preserved sections are

devoid of mucous membrane. The submucosa is very vascular with evidence of thrombic inflammation.

A portion of the bladder wall, probably from the region of the sphincter or of the prostatic urethra, shows intense post-mortem desquamation of cells, marked atheroma, calcification, and endarteritis of some of the large vessels. No definite evidence of carcinoma.

March 27, 1912. Further study of sections show marked necrosis of the inner vesical layers. Inflammation without any trace of carcinoma. April 1, 1912. Microscopic examination of the wall of the bladder shows extensive necrosis of the submucous layers, absence of the mucous and marked inflammation of the submucous coat, not the slightest evidence of carcinoma. On February 8 a patient, age 65, having had haematuria for eight months, was operated on, and a tumor two by three inches excised and the surface thoroughly cauterized by the bipolar spark. The post-operative period was free from haematuria. Death occurred three months later from carcinosis of the intestines, omentum and liver.

This method has been employed in five other instances. No conclusions can as yet be drawn from these cases. One is, however, impressed by the absence of bleeding and the small shock shown by the patient.

Experimental work on animals: The first series consisted of five large white rats. Two had sarcomatous tumors in the subcutaneous tissues of the abdominal wall. The other three had carcinomatous tumors. The tumors were thoroughly fulgurated with bipolar electrodes. In two cases the current burned a hole in the skin, the tumor was loosened and fell out.

Microscopical examination showed no evidence of extensive alteration. They were merely heated sufficiently to coagulate the proteid. All five animals died in from one to seven days. Remnants of neoplasm could be found in all. Death was not due to extension of the tumor. An acute entero-colitis resembling severe and extensive burns was found. In the second series six animals inoculated with carcinoma were used. Five of the rats were treated with fulguration; in one the bipolar current was used. The last animal died a few minutes after the current was applied. Of the five remaining tumors, four appeared to be growing, one appeared to be stationary.

At the end of twelve days the infected surface of two tumors which were ulcerating before the treatment had become clean, healthy surfaced, though the tumors are extending.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D., LOUISVILLE, KY.

The Role of Hydrotherapy in the Treatment of Pellagra. By George M. Niles, M.D. (*American Journal of the Medical Sciences*, August, 1913.)

It is significant and pleasing when a man of the position of the author of this article writes upon the role of hydrotherapy in the treatment of pellagra, and it is a double pleasure to abstract his article, for Niles' experiences in pellagra is extensive and well worthy anyone's consideration. He says that pellagra has assumed menacing proportions with all the suddenness of a forest fire, and, while many earnest investigators have been delving at the etiologic questions involved, the actual therapy would not wait upon their discoveries or conclusions. Pellagra as a pathological entity has been placed before us, and of necessity we have had to administer some form of treatment, whether rational or otherwise.

The medicinal, dietetic, hygienic, and even psychic treatment has been covered in recent literature, easily available to those interested. In hydrotherapy, though, we have an auxiliary whose helpful potentialities have not been sufficiently appreciated, and whose aid may be invoked with confidence in some of the most distressing phases of pellagra.

No claim for originality as to methods is made, but in their special application to this protean disease the writer trusts that some new and worthy suggestions may be adduced.

Let it be briefly stated that in pellagra we have a fourfold syndrome—gastro-intestinal, dermic, nervous, and psychic—one or more units of which may predominate. Some of the typical cases may show at once all four units of the symptom-complex, but, as a general rule, one to three are manifested, while the others are partly or wholly in abeyance.

It is hard to imagine a more melancholy spectacle than a confirmed pellagrin, with his anorexia, indigestion and diarrhea; his parched and discolored hands, perhaps face and feet; his burning tongue and extremities, coupled with shooting pains in different parts of the body; and often, overshadowing all, his changed mentality, varying in temperamental shade from indefinite blues to the blackness of melancholy and dementia.

Granted that all other possible therapeutic means are being assiduously employed, hydrotherapy may be advantageously

used, first for gastro-intestinal symptoms. For the frequent and sometimes constant nausea the drinking of from two to six glasses of tepid water once or twice daily, so that by its emesis the stomach may be washed, will prove beneficial.

Where it can be expertly performed, lavage once daily is better; but unless the medical attendant is an adept at introducing the stomach tube, lavage is best not attempted. In addition a cold water bag over the epigastrium placed there a half-hour before meals, and kept on fifteen to thirty minutes, plus drinking a half glass of iced water, exerts both a sedative and stomachic effect.

The frequent diarrhea may be greatly alleviated by hot colon irrigations, followed by cold sitz baths of five to ten minutes' duration. This double procedure may be repeated two to four times daily when the patient is not too weak.

Another valuable method consists in the use of cold abdominal compresses, sometimes called "Neptune's girdle," in which the abdomen is encircled by a thick towel of liberal proportions, saturated with cold water. This may be removed and resaturated every one or two hours. Copious water-drinking is generally advisable, tending by its volume to keep the kidneys "flushed," and, by its solvent power, diluting and washing out many of the toxins. The diarrhea, being of central origin, and mainly compensatory in character, is rarely increased by an abundance of water in the body. Occasionally the writer has seen the bowels apparently regulated by this means after they failed to respond to astringent or dietetic endeavors.

For the occasional constipation, warm enemas, high if necessary, are always in order, and always efficacious.

To increase skin elimination there can be used the so-called "long bath" or various hot packs. A caution in regard to the use of the electric-light chamber is timely, for this is contraindicated in pellagra on account of the danger of kindling or increasing dermal symptoms. The skin of all pellagrins is peculiarly susceptible to the influence of any strong light, and the attending physician will avoid some troublesome complications by keeping this fact in mind.

For the dermal manifestations, expressed by erythema and sundry grades of dermatitis, hydrotherapy has but a limited field of usefulness. Apart from keeping clean the surface of the body, water has no specific effect; indeed, where the skin symptoms are markedly eczematous it is well sometimes to omit bathing the crusted surfaces for a brief season, using oily applications instead. In the occasional troublesome itching of the skin a cool or cold saline bath is often grateful. This may be made by the addition of chloride of sodium, seven pounds; chloride of magnesium, one pound; sulphate of magnesium, half pound; water, thirty gallons.

•In many of the neuroses (of pellagra) we derive most comforting results from hydrotherapy. The burning hands and feet may be greatly soothed by either ice-cold compresses applied at frequent intervals, or baths in hot mustard water. In addition may be employed hot leg-and-arm-packs, and revulsive compresses to the spine. In the use of the last named the hot compresses should stay on from three to five minutes, while thirty seconds will be sufficient for the cold. Three treatments daily, of thirty minutes' duration, are sufficient, and the relief obtained is often remarkable. These neuroses, being the painful expressions of lesions in the nerve centers, are most stubborn, sometimes remaining in evidence long after all other traces of pellagra have disappeared; and these special baths, packs, and revulsive compresses have proved helpful in a number of cases under the observation of the writer, where analgesics and anodynes had failed to afford any lasting cessation.

It is perhaps in those pellagrins where the psychic manifestations predominate that hydrotherapy holds the widest and most useful scope. For the mental disquietude with transient exhilaration, associated with insomnia, the neutral full bath at 94° to 96° , lasting from one to two hours, morning and evening, exerts a soothing effect. This may be augmented by warm compresses to the back of the neck, kept on about fifteen minutes, and applied three times daily. Should the patient seem somewhat autotoxic, a free perspiration can well be induced at the end of these neutral baths by the use of hot packs, followed by suitable and brief cold application.

He should also drink water freely. In this connection a daily hot enema is often comforting, even if not specially indicated by any abnormal condition.

For mental depression and melancholia, the cold percussion spinal douche bath exerts a decidedly good effect. If the patient is robust physically this douche bath may begin as low as 45° , but 65° to 70° is usually better. Should this not be agreeable, spinal sponging, alternating with hot and cold water, affords a passable substitute. Pellagra, being in the main an afebrile disease, cold packs are seldom indicated, though in some "typhoid" cases, with muttering delirium, they hold a doubtful place.

For the anemia and debility so often following in the wake of acute pellagra, cold measures, discreetly applied, yield not only a tonic effect, but also an appreciable effect on the red blood count. This was proved by Prof. Winternitz as far back as 1893.

Practically all of these hydriatic measures, with the possible exception of the alternating douche, can be carried out at the home, though naturally a well-equipped institution, with

trained attendants, can apply them with greater ease and precision.

Until a specific is found for this dread disease, it is our duty to afford these forlorn sufferers every intelligent means of relief, and, from observation of over seventy-five pellagrins, with whom some form of hydrotherapy was employed and in whom some measure of relief was noted in every instance, the writer presents it as worthy the thoughtful consideration of those who are burdened with the weight of this difficult problem.

PHOTOTHERAPY AND DERMATOLOGY

EDITED BY HERBERT F. PITCHER, M.D.

The Progress of Radium-Therapy. By Dr. Saubermann, of Berlin. Abstracted from *Archives of the Roentgen Ray*.

The investigations of Dr. Saubermann and Professor Lazarus complete a chain of proofs that treatment of internal diseases by radium emanation not only exists, but is also acknowledged to be sound by the principle continental authorities.

The experimental results obtained are as follows: (1) Radium emanation, in not too large doses, promotes the growth and multiplication of healthy cells, while morbid cells decay. This statement was first put forward and proved by Madame Curie, and forms the very backbone of the case for radium emanation therapy.

(2) In the human body emanation works in various ways, among the most important being that it increases the quantity of urine. The diuresis is not due to absorption and elimination of an increased amount of fluid, but to the direct influence of the emanation contained in the fluid. This is proved by control experiments with plain water, when it will be found that only the fluid containing the radium produces the effects described.

(3) There is evidence from many quarters, including numerous well-known physicians, that emanation stimulates the activity of the digestive tract. Here again the result is not due merely to the absorption of an increased amount of fluid, but to the action of emanation on the intestinal nerves, and perhaps also on the walls of the intestines, and thus bringing about increased peristaltic action. This stimulating effect of emanation on the intestinal tract shows itself clinically by the lessening of chronic constipation and indigestion.

(4) Increase in the excretion of uric acid in the urine, also an increase in the urea contents of the urine, a fact which denotes either increased elimination of the waste products or more active metabolism of the organism.

(5) Dilatation of the blood vessels was first proved by Professor Levey and Dr. Plisch, by experiments on the hearts of cold-blooded animals or mammals and human beings.

(6) The viscosity of the blood is diminished. Experiments to prove this was performed upon many patients by Drs. Saubermann and Franzenbad.

(7) The blood pressure is lowered. This is the natural outcome of the two physiological facts above stated, namely, dilatation of the blood vessels and diminished blood viscosity, and this in turn leads to lessening of the pulse rate.

(8) Increased metabolism, especially of hydrocarbons. This is a physiological effect which was first discovered by Dr. Saubermann and his co-workers and afterward verified by Kikojj, and later by Bernstein in Van Noorden's clinic. This increased metabolism, proved as it is by measurement of the amount of carbonic acid excreted before and after a course of emanation treatment, is hardly open to disputes.

(9) Digestion, both in the stomach and intestines, is rendered more active, as shown by experiments of Professors Bergell, Beckell and Braunstein.

(10) Insomnia can be cured by emanation treatment. At present no assured explanation can be given for the effect produced. Dr. Saubermann thinks it may be due either to a direct stimulation of the nerve endings, or to an indirect action on the sympathetic nerve through the improvement of metabolism.

(11) Increase in sexual activity. This is a direct result of the demonstrable effect of emanation on the sexual glands, but sometimes it is also an expression of the increased vitality of the whole organism which is brought about by emanation treatment. When it occurs in cases of diabetis, it goes hand in hand with a lessened output of diacetic acid and sugar, and when these changes are not noticeable, with an increased tolerance for hydrocarbons, and a corresponding increase in body-weight.

(12) The constitution of the blood is modified. This effect of radium emanation is indubitable, and represents one of the most important bases for its therapeutic use.

The administration of even a few thousand mache units causes, firstly, hyper-leucocytosis, then leucopenia, and increase in the number of red corpuscles. The effect obtained in this direction is exactly proportionate to the doses employed. For example, one can secure in leukamia and pernicious anæmia very material leucopenia and great increase in red blood corpuscles, but this improvement is only symptomatic in these particular diseases, and does not last. On the other hand, the improvement similarly obtained by using emanation in the treatment of simple anæmia and its accompanying debility is real and lasting. There is another factor which

is of greater importance. The destruction of the leucocytes, which—as is well known—are rich in potassium and the carriers of many ferments, produces a liberation of these substances. This liberation is distinctly perceptible, partly in the blood, which is without doubt the place in which the oxidation processes occur, and partly through metastasis of the leucocytes into the liver, where they stimulate this important digestive organ to further activity.

Dr. Saubermann makes many other observations and recites many convincing physiological, biological, and chemical experiments in support of the clinical conclusions represented by the list of indications for emanation treatment.

He asks the question: Why are ferments activated by emanation? The answer to which was supplied years ago by the best known radium research workers, headed by Madame Curie. Radium emanation is an inert gas, and it does not combine chemically with any other known matter at any known temperature. It does its work by mere presence, just as does a Katalytic agent, which is capable of starting chemical changes or of increasing their activity remarkably if they are already in progress. This is especially true in regard to those processes which consist in taking up oxygen, and to which we apply the term oxidation.

The diseases in which radium emanation has been found most beneficial by some of the most eminent authorities in Europe are as follows: rheumatism of the joints and muscles (both acute and chronic), arthritis (subacute, chronic deformation and gonorrheal), neuralgia (intercostal, etc.), sciatica (including inflammation of the nerve ends), gout (uric acid diathesis), tabes dorsalis (diminution of lightening pains), catarrh of frontal sinus and the antrum, arterio-sclerosis, blood diseases, constipation, diabetes and glycosuria, nephritis.

DIETETICS AND ORTHOPEDICS.

EDITED BY F. E. PECKHAM, M.D.

Therapeutic Pathies, Creeds, and Sects; the Mushrooms of Scientific Medicine. By Anthony Bassler, M.D. (Abstracted from the *Medical Times*, August, 1913.)

Bassler marshals an astounding array of "pathies" homeopathy, eclecticism, osteopathy, electrotherapy, christian science, emmanuel movement, hydrotherapy, chiropractics, viteopathy, magnetic healing, suggestive therapeutics, naturopathy, messor-therapy, physio therapy, etc.

He says that eclectic schools are so far below the standard that a slow eradication of this sect is inevitable, and then pays his respects to homeopathy, osteopathy and christian science.

Hahnemann's book appeared in 1833, and a quotation reads: "The true healing art is that of intellectual offices incumbent on the higher human mind, and free powers of thought, discriminating and deciding according to causes," and also that "how to reach this result is taught by the homeopathic healing art." Another, "It was high time that God mercifully permitted homeopathy to be discovered," and Bassler adds, "Perhaps God should have hurried a little." He further says that "the advance of medicine has proven without a shadow of doubt that the bases of homeopathy are myths," and asks, "Where is the homeopath to-day who gives 1/1000 gr. morphine to allay pain?" It is rightfully stated also that but for the coming along of surgery, which they reluctantly accepted, homeopathy would have died twenty-five years ago. The author states that the "campaign for the progress of osteopathy has taken place in lay journals and not along the lines of scientific criticism." He also makes note of the fact that a number of States have given osteopathy more or less favorable recognition, and that a number of uninformed literary people—Mark Twain, Opie Reed, Ella Wheeler Wilcox and Emerson Hough—have helped the cause, and, lastly, that a celebrated Governor of New York practically legalized it in the Empire State.

Christian science is dubbed "a religio-medical farce, and Mrs. Eddy is considered a good homeopath as proved by a quotation: "Homeopathic remedies sometimes not containing a particle of medicine are known to relieve symptoms of disease. What works the cure? It is faith of mortal mind that changes its own self-inflicting suffering and produces a new effect upon the mind." The author calls attention again to the fact that children suffering from curable infectious diseases die when parents insist on their being treated by christian science. Bassler also states that "it is truly unfortunate that only within the past year the President of the United States saw fit to allow the populace of the District of Panama to accept this method of treating disease, after all that American medical science has done in eliminating disease from that pestilent zone."

The whole article is written in Dr. Bassler's entertaining style, and should be read in toto to be fully appreciated.

SOCIETY MEETINGS.

THE TWENTY-THIRD ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

HELD AT NEW YORK, SEPTEMBER 2, 3 AND 4, 1913.

The President, Dr. F. Howard Humphris, of London, Eng., in the chair.

The meeting was called to order by the President at 9.45 a.m., September 2.

On motion of Dr. Massey the reading of the minutes of the last meeting was omitted.

Report of the Board of Trustees.—The Secretary said the Board had held four meetings. They had disposed of various matters of business, including the censorship of papers and the election and resignation of fellows. A communication had been received from the Illuminating Engineering Society, which would be read later. He desired to call attention to the fact that the Board favored bringing up the question of holding a four-day session instead of three.

The Secretary read communications from Acting Chief of Staff of the War Department, Washington, D. C.; from Dr. Riviere; from Dr. Abrams, and from the Illuminating Engineering Society. The President suggested that the Secretary reply to these communications.

Election of Members.—The President stated that the Board of Trustees had met yesterday, and the following were elected new members: R. H. Pepper, J. W. Croft, S. M. Damaglou, H. A. Bishop, Janette Baldwin, W. W. Wilkinson, W. B. Orbin, C. Lincoln Banks, V. C. Kinney, G. W. Pfromm, C. E. Deering, F. J. Stansfield, W. H. Wallace, W. S. Garnsey, A. M. Clapp, C. H. Church, J. B. Bartram.

The President named as the Press Committee Drs. Titus and McFee.

Report of the Committee on Arrangements.—Dr. Law: There is not much to report. Convention and exhibition halls have been engaged at the Engineering Societies Building and headquarters established at the Hotel Astor. On Wednesday evening at six o'clock the business meeting will be held at the Astor. Immediately following the business meeting the banquet will be held in the adjoining room.

The President then delivered his address.

Reports of Standing Committees.—Dr. G. Betton Massey, chairman of the Committee on Direct Continuous Current, said he had no formal report to make this year.

Dr. Frederic de Kraft, of New York, read the report on Induced Currents. Discussed by Drs. Snow, Massey, F. B. Bishop, Hirsh, Pitcher, Granger, Cruikshank, Titus, Humphris and de Kraft.

Dr. Fred H. Morse, of Boston, read the report on Static Currents and Apparatus. Supplementary to this report Dr. F. B. Bishop, of Washington, read a report on the Bi-polar Application of Static Currents of Electricity. Discussed by Drs. Humphris, Travell, Pfahler, de Kraft, Titus, Snow, Dickson, Dr. Bishop closing.

(To be continued.)

MEDICAL PROGRESS

CLINICAL RESULTS WITH THE PHYLACOGENS.

Under the above caption Dr. R. W. Locher, Grafton, W. Va., in the *Memphis Medical Monthly*, has this to say: "In judging the therapeutic value of a new preparation, it is advisable that a great number of case reports be considered; and in order that the medical profession may have a great number of cases from which to judge, it is the duty of every physician to report such results as he may have. The Phylacogens are of comparatively recent origin, and yet even at this early date they have displayed their ability to produce satisfactory and in some cases remarkable results in the treatment of a great variety of pathological conditions. * * *

"We are informed that the Phylacogens are not claimed to be a 'cure-all' in any sense of the word, but simply valuable therapeutic agents in the treatment of numerous infectious conditions. From the very fact that all but Mixed Infection Phylacogen are to be directed against specific infections, it is necessary, before employing them, to make an accurate etiological diagnosis. For obvious reasons one cannot expect to produce results if Rheumatism Phylacogen is administered in a case that is really one of gonorrheal arthritis. Neither will an osteomyelitis or a syphilitic periostitis yield to Rheumatism Phylacogen, but the former may be logically treated with Mixed Infection Phylacogen. It would seem that this latter Phylacogen will ultimately prove of great value to the surgeon in combatting post-operative infections, as well as infections following injuries of all kinds."

The writer then details fourteen case reports, covering a variety of diseases, and adds this by way of comment:

"From the foregoing cases it would be possible to draw numerous conclusions. What is especially striking, however, is that the Phylacogen treatment is apparently successful in the vast majority of cases, and seems to give prompter and more definite results than is possible to secure with the usual recognized treatments. As a physician's experience increases he finds a greater number of cases in which each of the Phylacogens may be used, with the expectation of great benefit resulting therefrom. In any event, it must be conceded that Phylacogen in its various forms presents great possibilities and must be classed as a therapeutic agent which is more than worthy of trial."

THE VICTOR COMBISTAT.

We are just in receipt of an illustrated 48-page booklet, descriptive of the Victor Combistat, a combination or "All-in-One" electro-medical apparatus, this being the first and only instrument of its kind to be made in the United States.

The following currents and modalities are obtainable from

MEDICAL PROGRESS.

the Combistat, a single connection to the nearest electric light socket being all that is necessary:

Straight Galvanism, Compressed Air (tankless), Rapid Sinusoidal, Endoscopic Light, Surging Galvanism, Interrupted Secondary Faradism, Slow Sinusoidal, Vibratory Massage, Combined Galvanism and Faradism, Interrupted Combined Galvanism and Faradism, Surging Sinusoidal, Multiplex Sinusoidal, Cautery, Deep Suction, Primary Faradism, Interrupted Primary Faradism, Pneumatic Massage.

At first glance we are wonderfully impressed with the general appearance and possibilities of the Combistat on account of its compactness and universality.

We urge our readers to send for a booklet descriptive of the apparatus. Requests for same should be made direct to the manufacturers, Victor Electric Company, Jackson Blvd. and Robey St., Chicago.

AN ALTERATIVE OF LONG SERVICE.

It is mainly in chronic skin and glandular diseases that alteratives have found their most distinct field of usefulness, for these are conditions aggravated and continued by impaired nutrition and elimination, in the correction of which alteratives show what potent remedial forces they are. Among the alteratives Iodia (Battle) has long enjoyed professional favor, and in this will be found a striking demonstration of its value, for no class of drugs are put to a more rigid test than alteratives, so its long continued use by physicians is the best evidence that it meets the demands made upon it. Iodia (Battle) will show its power in chronic skin diseases, glandular involvements and in other states indicating the corrective influence of an alterative agent. A distinct advantage offered by Iodia is that it may be continued over long periods without causing distress.

"As a non-conductor of heat Antiphlogistine maintains the degree of temperature at which it is applied, or nearly so, for 12 to 24 hours, requires no attention whatsoever, and is in every way pleasant and agreeable."

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How dear to our hearts is the steady subscriber
Who pays in advance at the birth of each year,
Who lays down the money and does it quite gladly,
And cast 'round the office a halo of cheer.
He never says: "Stop it; I cannot afford it,
I'm getting more papers than now I can read."
But always says, "Send it; I surely do like it—
In fact all think it a help and a need."
How welcome his check when it reaches our sanctum,
How it makes our pulse throb; how it makes our hearts dance.
We outwardly thank him; we inwardly bless him—
The steady subscriber who pays in advance.

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